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The Leguminous Plants of North Carolina

By Robert L. Wilbur





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Preface

The account of North Carolina legumes presented here is the result of a long-protracted study formally begun by Dr. William B. Fox (1915-1952) in 1949 and prosecuted most vigorously by him until his accidental death on November 15, 1952. Dr. Robert K. Godfrey continued the study with his characteristic energy until his transfer to Florida in 1954 made it impossible for him to complete the project as he had planned. North Carolina State College's highly creditable herbarium in large part owes its existence to the zeal of both these men, and at least in part is a by-product of this investigation of the legumes of the state.

After Dr. Godfrey's departure, the project became my responsibility and its support was continued by the Agricultural Experiment Station of North Carolina State College until August 1957. Mostly during the summers of this period a rough manuscript was prepared, and numerous field trips undertaken. Time was spent studying herbarium specimens in the three herbaria found within the Research Triangle, in addition to those of the Gray Herbarium of Harvard, the New York Botanical Garden, the Smithsonian Institution and the Chicago Natural History Museum. I should like to express here my appreciation to the

Curators of each of these herbaria whose courtesy not only made the study much more complete but made my stay a pleasure as well.

The voluminous collections made by the botanists at the University of North Carolina in their intensive collecting of the past several years were all placed at my disposal. I am particularly grateful to that institution's curator, Mr. Harry E. Ahles, and his colleagues for this privilege which added much to our knowledge of the distribution and variation of our legumes. Most of the study of their collections as well as a complete revision of the original manuscript was carried out between 1957 and 1961 while a member of the Department of Botany of Duke University.

This study, like most scientific investigations, is of course not final, but a summation of our current knowledge and should serve as a convenient starting point for future studies.

The illustrations were prepared by Mr. Will Hon whose talents have added much to the usefulness of this account. I am most appreciative of his patient care in a task made even more trying in that most of the work was done while he was a resident of Kentucky.

ROBERT L. WILBUR

Durham, North Carolina
August, 1961

Introduction

The legume family is probably the third largest among vascular plants being exceeded in number of species only by the grass and orchid families. In economic importance it is perhaps surpassed only by the grass family. Of the 500 or more genera and 12,000-15,000 species comprising the Leguminosae, North Carolina's representation consists of about 172 species belonging to 49 genera. In contrast, the legume flora of Texas with a land area more than five times larger is slightly more than twice as richly endowed with species distributed in about 56 genera. Illinois, a state with about 12 percent larger surface area, in contrast has only 110 species distributed in but 37 genera. The inequalities of representation are not so much a matter of size or even proximity to the tropics, where the family as a whole is best developed, but due to diversity in climate, soils and vegetational types.

The distribution of the leguminous plants of North Carolina, like that of most large taxa of both plants and animals, often ex-

hibits a close correlation with the three principal physiographic provinces: the Mountains, Piedmont and Coastal Plain. The floristic boundary between the Mountains and Piedmont is however much less pronounced than that between the Piedmont and the Coastal Plain. Instead of listing the species that might be said to characterize each of these physiographic provinces, it is felt that the distribution maps presented in the following pages should suffice. Still, until much more is known about the distribution of the southeastern flora as a whole, error in interpretation of the distribution of the taxa of any given state will be inevitable.

For the users of this paper, who are not botanists, the necessary technical terminology may prove an initial obstacle. But it can be minimized by reference to the glossaries presented in any standard taxonomic work: e.g. Gray's *Manual of Botany* 8th edition, or the New Britton and Brown *Illustrated Flora of the Northeastern United States and Adjacent Canada*, or Lawrence's *Taxonomy of Vascular Plants*.

Artificial Key To The Genera of North Carolina Legumes

1. Trees, shrubs or woody vines.
2. Leaves simple or 1-foliolate.
3. Leaves all simple, broader than long or nearly so and more than 4 cm wide; calyx (and hypanthium) roseate-purple to pink; petals pink to roseate (or rarely white); stamens distinct; legumes glabrous; stems dull reddish-brown or at least not green 3. CERCIS. (p. 19)
3. Leaves mostly 3-foliolate with only the upper 1-foliolate, leaflets longer than broad (usually more than twice as long) and less than 1 cm wide; calyx green; petals bright yellow; stamens monadelphous; legume shaggy-villous along the margins; stems greenish 12. CYTISUS. (p. 73)
2. Leaves compound.
4. Leaves 3-foliolate.
5. Petals bright yellow; stamens monadelphous and the filaments alternating long and short; upper leaves often 1-foliolate and the leaflets less than 0.5 cm wide 12. CYTISUS. (p. 73)
5. Petals rosy-purple to blue- or violet-purple; stamens diadelphous or if monadelphous the filaments not alternating long and short; leaflets all 3-foliolate and more than 0.5 cm wide.
6. Erect bushy shrubs with rose-purple petals and the standard 1.2 cm long or less; legume 1-seeded, indehiscent, appressed short pubescent, 1 cm long or less 26. LESPEDEZA. (p. 171)
6. High-climbing or long-trailing vine with blue- or violet-purple petals and with the standard 1.5 cm long or more; legume several-seeded, dehiscent, villous, 4 cm long or longer 46. PUERARIA. (p. 269)
4. Leaves with 4 or more leaflets.
7. Leaves twice-pinnately compound; flowers regular.
8. Leaflets strikingly asymmetrical (i.e. most of the blade by far on one side of the midvein); stamens numerous, their filaments united into a conspicuous tube; flowers borne in dense heads 1. ALBIZIA. (p. 14)
8. Leaflets symmetrical or very nearly so; stamens 10, their filaments distinct and attached to the rim of the hypanthium; flowers borne in racemes or panicles.
9. Leaves 2-pinnately compound with entire leaflets 1.5 cm or more wide and with acuminate apices; legume thick and woody; trunk and branches thornless. 5. GYMNOCLADUS. (p. 30)
9. Leaves 1-2-pinnately compound with finely crenulate leaflets less than 1.5 cm wide and usually obtuse or rarely somewhat acute at apex; legume thin and papery to membranous; trunk and branches often bearing conspicuous thorns 6. GLEDITSIA. (p. 32)
7. Leaves once-pinnately compound; flowers regular or irregular.
10. Flowers regular, greenish; leaflets crenulate; thorns often present on trunk and branches 6. GLEDITSIA. (p. 32)
10. Flowers irregular, white, yellow, blue or roseate or at least not greenish; leaflets entire; thorns absent (but stipular spines often present in Robinia.)
11. Leaves even-pinnately compound (i.e. terminal leaflet lacking); legume 1 cm thick or more, conspicuously 4-winged 29. DAUBENTONIA (p. 200)
11. Leaves odd-pinnately compound (i.e. terminal leaflet present); legume less than 1 cm in thickness and not 4-winged or if nearly 1 cm thick then wings lacking.
12. Wings and keel petals absent (i.e. flower with but one petal); calyces, fruit and often the leaflets glandular-punctate 17. AMORPHA. (p. 107)
12. Wings and keel petals present (i.e. flowers with 5 petals); neither calyces, fruit nor leaflets glandular-punctate.

13. Stamens distinct; inflorescence a panicle; petals white; leaflets estipellate; calyx-lobes obtuse 7. CLADRASTIS. (p. 41)
13. Stamens diadelphous; inflorescence a raceme; petals white, pink, rose or blue; leaflets stipellate; calyx-lobes acute to acuminate.
14. Climbing vines with racemes terminating short branches; petals blue or violet (or more rarely white); spines or thorns lacking; stamens diadelphous; intrastaminal disk present 30. WISTERIA. (p. 202)
14. Erect trees or shrubs with axillary racemes; petals white, pink, roseate or purplish; stipular spines often present; stamens monadelphous; intrastaminal disk lacking 31. ROBINIA. (p. 207)
1. Herbs.
15. Leaves 2-pinnately compound; flowers regular; petals united into a funnellform tube 2. SCHRANKIA. (p. 16)
15. Leaves simple or but once-compound; flowers irregular; petals not all united together.
16. Leaves all simple or 1-foliate (if only the upper-most leaves are simple, do not follow this lead.)
17. Stamens monadelphous; anthers alternately of two forms (5 subglobose and versatile and 5 oblong or linear and basally attached); flowers borne in terminal racemes.
18. Petals yellow; legume inflated; leaves sessile or nearly so or petioles at least shorter than the breadth of the leaf 10. CROTALARIA. (p. 58)
18. Petals bluish to roseate-purple; legume more or less flattened; leaves long-petiolate, the petiole longer than the breadth of the leaf 11. LUPINUS. (p. 69)
17. Stamens diadelphous; anthers all alike or very nearly so; flowers borne in axillary racemes 41. RHYNCHOSIA. (p. 251)
16. Leaves compound.
19. Leaves predominately 3-foliate (*alternate lead* p. 10)
20. Filaments of stamens distinct.
21. Ovary conspicuously stalked; legume inflated or turgid; petals white, creamy, yellow or blue 8. BAPTISIA. (p. 41)
21. Ovary sessile or nearly so; legume flattened or strongly compressed; petals yellow 9. THERMOPSIS. (p. 52)
20. Filaments of stamens united into a monadelphous or diadelphous tube.
22. Leaflets usually at least slightly serrulate or denticulate; flowers often borne in a dense, head-like or spike-like cluster.
23. Leaves palmately 3-foliate (i.e. the terminal leaflet sessile and not borne on a stalk-like rachis) 13. TRIFOLIUM. (p. 75)
23. Leaves pinnately 3-foliate (i.e. the petiolule of the terminal leaflet attached to the stalk-like rachis).
24. Petals withering but persistent, adhering to the staminal tube and concealing the ripened, membranous pod 13. TRIFOLIUM. (p. 75)
24. Petals deciduous soon after opening, free from the staminal tube and not concealing the ripened pod.
25. Flowers in long, slender racemes; pod compressed, ovoid to obovoid and straight or nearly so; stipules setaceous to linear or occasionally lanceolate, never toothed or dissected; petals yellow or white 41. MELILOTUS. (p. 93)
25. Flowers in short, dense spike-like racemes or heads; pods laterally compressed but usually strongly curved or spirally coiled (but rarely only slightly curved); stipules usually lanceolate to ovate, often deeply toothed (if stipules linear to lanceolate, then petals bluish-violet); petals yellow or bluish-violet 15. MEDICAGO. (p. 98)
22. Leaflets entire or merely lobed but never finely toothed; flowers usually not in compact, head-like clusters.

26. Leaflets noticeably glandular-punctate on either or both surfaces under magnification.
27. Petals blue to violet; fruit 1-seeded and indehiscent (or at least only tardily and irregularly dehiscent); leaflets pinnate or palmate 18. PSORALEA. (p. 114)
27. Petals yellow; fruit dehiscent and (1) 2-3-seeded; leaflets pinnately arranged 42. RHYNCHOSIA. (p. 251)
26. Leaflets eglandular
28. Leaves palmately compound (i.e. the petiolule of the terminal leaflet not borne on a stalk-like rachis); petals yellow; stamens monadelphous; inflorescence an elongate, terminal raceme; plants annual 10. CROTALARIA. (p. 58)
28. Characters not present in the combination listed in Lead 28 above.
29. Stems erect or ascendant; plants neither climbing, twining or trailing vines nor with prostrate stems. (*alternate lead p. 9*)
30. Standard scarlet and more than 2.5 cm long; seeds scarlet; flowers borne in elongate, terminal racemes usually borne on leafless stems arising from the crown 39. ERYTHRINA. (p. 245)
30. Standard white, pink, red, purple, blue, yellow or if bright red much less than 2.5 cm long; seeds brownish or at least not scarlet; flowers borne in axillary clusters or terminating leafy stem or if borne on a leafless stem then the standard less than 2 cm long.
31. Stipules represented apparently only by a pair of blackish or reddish-brown glands; filaments all or partly dilated just beneath the anthers. 16. LOTUS. (p. 103)
31. Stipules setaceous. linear, lanceolate, ovate or at least not reduced to a pair of glandular callosities; filaments all equally tapering beneath the anthers or at least not noticeably swollen.
32. Fruit indehiscent and 1-seeded or if 2- to several-seeded then transversely partitioned into 1-seeded indehiscent joints.
33. Petals bluish (blue, lavender or violet); pod 1-seeded; 18. PSORALEA. (p. 114)
33. Petals yellow, white, pink, purple or at least not bluish; pod 1-seeded or composed of 2 to several 1-seeded segments.
34. Petals bright butter-yellow; stipules adnate to the petiole and united together to form a more or less sheath-like sleeve about the stem; petals and stamens attached to the rim of the elongate, pedicel-like hypanthium; anthers of two alternating types, 5 oblong and 5 subglobose. 24. STYLOSANTHES. (p. 131)
34. Petals pink, purple, white or pale yellow (at least not bright butter-yellow); stipules not fusing to form a sleeve-like sheath about the stem; hypanthium lacking or apparently so; anthers alike or at least not alternating between oblong and subglobose.
35. Legume (1)2-several jointed, segments moderately to densely covered with minute barbed hairs which render the segments strongly adherent; calyx lacking subtending pair of bractlets; stipels usually present (in all but three of our species) 25. DESMODIUM. (p. 134)
35. Legume a 1-seeded, non-adherent article (i.e. surface of fruit glabrous or when pubescent lacking barbed, adhesive hairs); calyx subtended by a pair of closely appressed bractlets; stipels lacking 26. LESPEDEZA. (p. 171)
32. Fruit dehiscent and (1)2-several-seeded and not divided into 1-seeded, indehiscent segments.
36. Standard 2.5 cm long or more and about twice as long as the wing and keel petals 40. CLITORIA. (p. 249)
36. Standard less than 2.5 cm long and not more than half again as long as the wing and keel petals.

37. Legume densely shaggy brown villous; stamens monadelphous; annuals 46. GLYCINE. (p. 267)
37. Legume short-pubescent but never shaggy villous; stamens diadelphous; perennials.
38. Rachis-stalk of the terminal leaflet 3 mm long or longer; stipels absent; petals yellow; foliage, calyx and fruit with numerous, microscopically visible, amber-colored glands 42. RHYNCHOSIA. (p. 251)
38. Rachis-stalk of the terminal leaflet obsolete or apparently so or at least not as long as 3 mm; stipels present; petals pale purplish to white; foliage, calyx and fruit without amber-colored glands 49. GALACTIA. (p. 272)
29. Stem trailing or climbing; plants with climbing, twining, trailing or prostrate stems.
39. Standard 2 cm long or longer and about twice as long as the wing or keel petals; petals pale-blue to lavender.
40. Calyx-tube shorter than the lobes, shorter than and hidden by the conspicuous subtending bractlets (the bractlets ovate and 8 mm long or more); legume sessile, 6 cm long or longer; style bearded only near the stigma; standard spurred 40. CENTROSEMA. (p. 247)
40. Calyx-tube much longer than the lobes, larger and not hidden by the small subtending bractlets (the bractlets linear and 6 mm long or less); legume less than 6 cm long and with an elongate stipe; style bearded along the upper side; standard lacking a spur 41. CLITORIA. (p. 249)
39. Standard 2 cm long or less and not more than half again as long as the wing or keel petals; petals white, yellow, pink, reddish, purple or blue-violet.
41. Fruit indehiscent and 1-seeded or if 2- to many-seeded then transversely partitioned into 1-seeded, indehiscent joints covered with barbed hairs rendering the fruit strongly adhesive.
42. Stipules partially adnate to the petioles and somewhat fused together forming a sleeve-like sheath about the stem; petals bright butter-yellow 24. STYLOSANTHES. (p. 131)
42. Stipules neither fused to the petiole nor fused together nor forming a sheath about the stem; petals pink to roseate-purple or, if yellow, at least not bright butter-yellow.
43. Stipels present; calyx lacking a pair of closely subtending bractlets; fruit a (1)2-several jointed loment, each segment of which contains 1 seed and whose surface is densely covered with adherent, minutely barbed hairs 25. DESMODIUM. (p. 134)
43. Stipels absent; calyx closely subtended by a pair of appressed bractlets; fruit a 1-seeded loment whose surface is sparsely to densely covered with non-adherent, straight, unbarbed hairs 26. LESPEDEZA. (p. 171)
41. Fruit dehiscent, (1)2-many seeded and the seeds not partitioned off into 1-seeded, indehiscent segments nor are the fruits rendered adhesive by the presence of barbed hairs.
44. Petals yellow; foliage with numerous, microscopically discernible, amber-colored resin droplets on one or both surfaces; stipels lacking 42. RHYNCHOSIA. (p. 251)
44. Petals white, pink, reddish, purple, blue or violet or, if yellow, the foliage lacking amber-colored, resinous droplets; stipels present; bractlets present (except in 1 species).
45. Style bearded along the upper surface; keel-petals coiled or curved.
46. Flowers several to numerous in elongate racemes; keel-petals spirally coiled 43. PHASEOLUS. (p. 257)
46. Flowers 1-few in pedunculate, compact racemes resembling umbels, heads or spikes; keel-petals not spirally coiled, merely strongly incurved.
47. Wing-petals auricled at base; seeds glabrous; petals yellow or purplish 44. VIGNA. (p. 261)

47. Wing-petals lacking basal auricles; seeds wooly-pubescent; petals pink to purplish 45. STROPHOSTYLES. (p. 265)
45. Style beardless; keel-petals arching but never laterally curved or coiled.
48. Bracts present but paired bractlets subtending the calyx absent; calyx-tube 2 or more times as long as the lobes 48. AMPHICARPA. (p. 269)
48. Bracts and paired bractlets subtending the calyx both present; calyx-tube less than twice the length of the lobes.
49. Standard 1.5 cm long or longer, blue-violet with a yellow blotch near base of its blade; legume shaggy-pubescent 47. PUERARIA. (p. 269)
49. Standard less than 1.5 cm long or, if longer, then pink, reddish or purple and lacking the yellow spot near base of the blade; legume minutely pubescent to shaggy-villous (but never shaggy-villous, if the standard exceeds 1.2 cm long).
50. Legume densely brown shaggy-villous, more than 8 mm wide; petals white to purple; plants bushy and more or less erect but often with some vine-like branches 46. GLYCINE. (p. 267)
50. Legume sparingly pubescent to densely tomentose but not brown shaggy-villous, less than 7 mm wide; petals pink, reddish or purplish; plants trailing or twining, climbing vines 49. GALACTIA. (p. 272)
19. Leaves with 4 to numerous leaflets.
51. Leaflets palmately arranged.
52. Leaflets filiform, less than 2 mm wide; petals blue or violet; legume 1-seeded, indehiscent and obliquely cross-wrinkled 18. PSORALEA. (p. 114)
52. Leaflets linear to oblanceolate, more than 3 mm wide; petals yellow and legume indehiscent and segmented into 1-seeded, bristly joints or petals blue to whitish and then the legume dehiscent and several-seeded.
53. Petals yellow; leaflets fewer than 5, usually 4 and mostly less than 2.5 cm long; plants trailing or prostrate; fruit a 2-4(5)-segmented, disarticulating, bristly loment 22. ZORNIA. (p. 127)
53. Petals blue (or rarely white or even roseate or pinkish); leaflets more than 5, mostly 7-11 and mostly more than 2.5 cm long; plants erect or strongly ascendant; fruit a dehiscent, non-bristly (but short-pubescent to villous) legume 11. LUPINUS. (p. 69)
51. Leaflets pinnately arranged.
54. Leaves even-pinnately compound (i.e. terminal leaflet lacking although sometimes replaced by a bristle or tendril.) (*alternate lead* p. 11)
55. Leaf terminated by a conspicuously exerted bristle or tendril.
56. Style more or less terete in cross-section and with a tuft of hairs at the summit; staminal tube oblique at apex 35. VICIA. (p. 228)
56. Style strongly flattened and hairy down its inner or upper side; staminal tube truncate at apex.
57. Wings adherent to the keel; calyx-lobes leafy and mostly exceeding the calyx-tube in length; stipules equaling the leaflets in size or exceeding them 36. PISUM. (p. 234)
57. Wings free from the keel or nearly so; calyx-lobes not leafy and mostly exceeded in length by the calyx-tube; stipules exceeded in size by the leaflets 37. LATHYRUS. (p. 236)
55. Leaf lacking tendril or even a conspicuously exerted bristle.
58. Corolla not papilionaceous, petals usually not conspicuously differing in size or shape, the upper petal innermost in bud; flower only slightly zygomorphic; filaments free; anthers opening by two apical pores 4. CASSIA. (p. 20)

58. Corolla papilionaceous, petals conspicuously differing in size and shape and the uppermost petal outermost in bud; flower strikingly zygomorphic; filaments fused into a monadelphous or diadelphous tube; anthers opening by longitudinal slits.
59. Leaflets usually 4 in number; stipules partly adnate to the petiole; stamens monadelphous; anthers polymorphic; fruit subterranean 23. ARACHIS. (p. 129)
59. Leaflets 10 or more in number per leaf; stipules not partially fused to the petiole; stamens diadelphous; anthers similar or nearly so; fruit aerial.
60. Filaments united into 2 groups of 5 each; stipules peltately attached with a conspicuous basal appendage extending below the point of attachment; fruit a 2- to many-segmented, disarticulating loment 20. AESCHYNOMENE. (p. 123)
60. Filaments united into one open tube of 9 with one filament free; stipules basally attached and lacking a basal appendage; fruit a dehiscent pod.
61. Legume linear, 20-times or more as long as wide; seeds 20 or more in number; legume-stipe less than 5 mm long; calyx not conspicuously oblique; calyx-lobes all 1 mm long or more; standard 1 cm long or more 27. SESBANIA. (p. 195)
61. Legume oblong to elliptic, less than 5-times as long as wide; seed (1)2 in number; legume-stipe 8 mm long or more; calyx conspicuously oblique; calyx-lobes all less than 1 mm long and the shortest usually about 0.2 mm long; standard 1.0 cm long or less 28. GLOTTIDIUM. (p. 198)
54. Leaves odd-pinnately compound (i.e. terminal leaflet present).
62. Inflorescence umbellate or flowers densely clustered and borne in an involucre head or shortened spike.
63. Flowers borne in a compact, involucre head; leaflets linear-filiform, less than 1 mm wide and glandular-punctate; corolla at most vaguely papilionaceous; legume 1-seeded and indehiscent; stamens monadelphous and 5 in number 19. PETALOSTEMUM (p. 120)
63. Flowers borne in loose, umbellate cluster and not closely enveloped by ovate, persistent bracts; leaflets elliptic to oblong or obovate, or at least not filiform, more than 2 mm in width, eglandular; corolla clearly papilionaceous; legume 2- to many-seeded and either dehiscent or disarticulating into indehiscent 1-seeded segments; stamens diadelphous, 10 in number.
64. Leaflets 7 per leaf or fewer; legume not partitioned into 1-seeded, disarticulating segments, dehiscent 16. LOTUS. (p. 103)
64. Leaflets 9 or usually more numerous; legume partitioned into 3-7, disarticulating, 1-seeded, indehiscent segments 21. CORONILLA. (p. 127)
62. Inflorescence racemose, paniculate or spicate (or flowers solitary) but at least neither umbellate nor in a dense head-like cluster surrounded by ovate, involucre bracts.
65. Petal 1; leaflets inconspicuously to conspicuously glandular-punctate; stamens monadelphous, the filaments not united for over half their length. 17. AMORPHA. (p. 107)
65. Petals 5; leaflets not glandular-punctate; stamens monadelphous or diadelphous, the filaments more or less united into a sheath for more than half their length.
66. Stamens united into two groups of 5 filaments each; legume composed of 2- to many, disarticulating, 1-seeded, indehiscent joints; leaves with mostly 31 or more leaflets; calyx strikingly 2-lipped, its lobes inconspicuous 20. AESCHYNOMENE. (p. 123)
66. Stamens united into a tube of 9 filaments and with 1 lone filament; legume dehiscent and not partitioned into dehiscent, 1-seeded joints; leaves with mostly fewer than 20 leaflets; calyx not conspicuously 2-lipped and with 5 more or less unequal although readily apparent lobes.

67. Twining, climbing, herbaceous vine more than 1 m long and with 5-7 leaflets 38. APIOS. (p. 243)
67. Erect herbs, or if prostrate or trailing, less than 1 m long and then the leaflets usually more numerous than 7.
68. Leaflets densely covered on one or both surfaces with minute, 2-branched hairs appearing to be attached by their middle.
69. Keel-petals laterally pouched; legume 1-celled and with neither suture protruding into the locule 32. INDIGOFERA. (p. 215)
69. Keel-petals not pouched; legume 2-celled 34. ASTRAGALUS. (p. 222)
68. Leaflets glabrate to densely pubescent but the trichomes never malpighiaceous (i.e. never 2-forked or appearing to be attached at their middle).
70. Principal racemes terminal or, if appearing lateral, then apparently opposite the leaf; legumes flattened or compressed and with neither suture intruding; standard orbicular to broadly obovate 33. TEPHROSIA. (p. 216)
70. Principal racemes axillary; legumes swollen or somewhat inflated, with 1 intruding suture; standard oblong-obovate .. 34. ASTRAGALUS. (p. 222)

Leguminosae

Trees, shrubs or herbs with mostly alternate, usually once or twice pinnately compound (but also palmately compound or even simple) leaves almost always stipulate and often stipellate. Flowers rarely solitary, usually in axillary or terminal clusters; commonly in racemes, panicles, spikes or heads, occasionally in umbels and rarely in cymes, often subtended by bracts and bractlets. Flowers almost always bisexual, actinomorphic (regular) or more commonly zygomorphic (irregular) and usually with a complete perianth, typically hypogynous or somewhat perigynous. Calyx usually gamosepalous, usually 5-parted. Corolla almost always present, rarely lacking or reduced to a single petal, typically 5-parted, distinct or the lower 2 partly or completely adherent along one side or all gamopetalous, imbricate or valvate. Stamens usually 10, occasionally 5 or rarely even fewer, but some-

times numerous, distinct, monadelphous or diadelphous; anthers usually 2-celled, usually dehiscing by longitudinal slits or less commonly by apical pores. Pistil 1 (very rarely 2-15), 1-carpellate, usually 1-loculate, the placentation parietal along the ventral suture; the ovary superior, sessile or stalked. Fruit usually a legume dehiscing along both sutures (or rarely follicular and then splitting only along one side) or variously modified—sometimes a loment (the fruit constricted between the seeds and breaking into 1-seeded indehiscent segments) and sometimes fleshy or membranous and occasionally indehiscent. Seeds usually with little or no endosperm.

A very large family (often treated as three) with perhaps 500 or more genera and 12,000-15,000 species widely distributed and numerous on six of the continents but most numerous in the tropics and warm temperate regions.

Key To The Subfamilies of The Leguminosae

1. FLOWERS REGULAR (ACTINOMORPHIC); SEPALS AND PETALS VALVATE IN BUD; PETALS (IN OURS) UNITED; LEAVES ALL BIPINNATELY COMPOUND (IN OUR SPECIES) Subfamily I. MIMOSOIDEAE. (p. 14)
1. FLOWERS IRREGULAR (ZYGOMORPHIC) OR RARELY ALMOST REGULAR; SEPALS AND PETALS IMBRICATE IN BUD; PETALS ALL DISTINCT OR ONLY THE LOWERMOST UNITED; LEAVES OFTEN OTHER THAN BIPINNATELY COMPOUND.
 2. THE UNPAIRED (i.e. POSTERIOR OR UPPERMOST) PETALS INNERMOST IN BUD; PETALS DISTINCT; FILAMENTS DISTINCT (IN ALL OF OURS i.e. FILAMENTS NOT UNITED TO ONE ANOTHER) Subfamily II. CAESALPINIOIDEAE. (p. 19)
 2. THE UNPAIRED (i.e. POSTERIOR OR UPPERMOST) PETAL OUTERMOST IN BUD; THE ANTERIOR OR LOWERMOST PETALS OFTEN CONNATE; THE FILAMENTS COMMONLY MONADELPHOUS OR DIADELPHOUS BUT OCCASIONALLY DISTINCT Subfamily III. PAPILIONOIDEAE. (p. 37)

Subfamily I. MIMOSOIDEAE

(Mimosaceae of many authors).

Mostly trees or shrubs, or more rarely herbs with alternate, stipulate, usually 2-pinnately or less commonly 1-pinnately compound leaves. Flowers regular, perfect or unisexual, usually small and clustered in mostly densely flowered spikes, umbels or heads. Perianth (3)4-5(6)-merous, valvate in bud. Calyx usually gamosepalous, minutely toothed or lobed. Corolla gamopetalous or polypetalous, valvate in bud. Stamens equaling the sepals in number, twice as many or often very numerous; filaments usually long-exserted, distinct or united below into a tube. Embryo straight and usually surrounded by abundant endosperm.

Perhaps 40 genera and 2000 species chiefly found in the tropics and warm-temperate regions.

1. Medium-sized tree; branches and rachises lacking prickles; stamens numerous, more than 20, their filaments united below into a tube exserted from the corolla; legume thin and smooth 1. *ALBIZIA*.

1. Prostrate or procumbent herb; branches and rachises with numerous, hooked prickles; stamens 15 or usually fewer, filaments distinct or very nearly so (the staminal tube, if present, inserted and less than 1 mm long); legume 4-angled and prickly-armed 2. *SCHRANKIA*.

1. *ALBIZIA* Durazzini, Mag. Tosc. 3: 11. 1772.

Small to medium-sized, unarmed trees or shrubs. Leaves usually deciduous, evenly 2-pinnately compound with numerous, usually small leaflets or with larger leaflets and then fewer in number; and usually bearing glands on petiole, rachis or even on the pinnae. Stipules usually obsolete or setaceous but occasionally large and membranaceous. Inflorescence of solitary or panicked, globose heads or spikes and these axillary or terminally arranged. Flowers perfect or polygamous, white, yellow or pink, mostly 5-parted. Perianth valvate in bud. Calyx gamosepalous, tubular or campanulate, the lobes 5-dentate or shortly lobed. Corolla gamopetalous, funnel-form, deeply 5-lobed. Stamens numerous, long-exserted, the filaments connate below and often forming an elongate, exserted tube; anthers minute. Legume a large, thin, flat, strap-shaped, nonseparate, indehiscent pod without pulp.

A genus of perhaps 60 or more species of tropical and subtropical America, Australia and Eurasia but mostly of the Old World

tropics. (Name commemorates the Albizzi, a noble Italian family, a member of whom introduced the type of this genus (*A. Julibrissin*) into Tuscany shortly after 1749). The generic name was originally and hence properly should be written with a single "z".

1. *ALBIZIA JULIBRISSIN* Durraz., Mag. Tosc. 3:11. 1772.

Flat-topped tree up to about 12 m high with a rather smooth brown bark. Lenticels linear and conspicuous. Stipules linear, acute, 3-7 mm long, caducous. Petiole about 2-8 cm long, glabrous to sparsely puberulent, with an orbicular 1 mm gland on the upper side about 1-2 cm from stem. Leaves deciduous, about 1-2 dm long. Pinnae lacking terminal leaflet, approximately opposite, 6-24, about 4-10 cm long, the rachis usually puberulent. Leaflets numerous, approximate, usually about 20-40 per pinna, opposite or nearly so, sessile, ciliate, more or less glabrous and dark green above, puberulent and paler beneath, about 8-15 mm long and 3-5 mm wide, oblong and somewhat falcate, the lower margin arching, the upper straight or nearly so, the midvein less than 1 mm from the upper margin, acute and with base obliquely truncate. Inflorescence of capitate heads arranged in terminal, panicle-like clusters mostly 8-15 cm long; the individual heads about 3-5 cm in diameter composed of about 15-25 sessile flowers, the stalks of the individual clusters slender, about 1 mm in diameter, puberulent, 1-2 cm long. Calyx pale green, the tube about 1.5-3 mm long, tubular, glabrous; the lobes dentate, about 0.1-0.2 mm long, acute, ciliate. Corolla funnellform, about 5-10 mm long, pale green, externally puberulent; the tube 4-8 mm long or about twice as long as the calyx; the lobes about 2-3 mm long, acute and somewhat ovate. Staminal-tube white, about 7-15 mm long, longer than the corolla, free length of the filaments 2-3 cm long, white below but turning pink to roseate above, terminated by a small greenish anther about 0.1 mm long. Pistils of the functionally staminate flowers (usually peripheral) about 2 mm long, entirely included within the staminal tube, the ovary 1-1.5 mm long, style about 0.5 mm long. Pistils of the functionally perfect flowers 2.0-3.5 cm long; the ovary about 2 mm long, the style about 2-3.5 cm long, long exserted. Legume about 8-18 cm long, 2-3 cm wide, thin, flat, the margins undulate, tapering at both ends, light brown.



Fig. 1. *Albizzia Julibrissin*. (a) Distribution; (b) Leaflet; (c) Inflorescence; (d) Leaf and fruit.

DISTRIBUTION: Native of Asia from Iran to China. Widely introduced in the tropical and warm temperate regions of both hemispheres. Frequent in cultivation from Maryland to Florida, west to Louisiana and north to Kentucky and Indiana. Commonly escaped along roadsides and borders of woods and becoming naturalized. Widespread in North Carolina in cultivation and also naturalized. Although poorly represented in our collections, the MIMOSA is probably to be found in almost every county.

2. *SCHRANKIA* Willd., Sp. Pl. 4:1041. 1806. (not of Medic., Pflanzengatt. 1: 42. 1792.) *nom. conserv.*

Leptoglottis DC., Mem. Leg. 451. 1825.

Morongia Britton, Mem. Torr. Bot. Club 5:191. 1894.

Perennial herbs or occasionally near-shrubs with prostrate, procumbent or weakly arching stems conspicuously angled and bearing numerous, short, recurved prickles. Leaves deciduous, evenly bipinnately compound with 1-7 pairs of pinnae attached to the prickly rachises. Leaflets numerous, sensitive, minute to small, sessile or nearly so, strongly inequilateral. Stipules setaceous. Inflorescences of globose heads or short spikes borne on axillary, slender, usually prickly peduncles. Flowers sessile, perfect or polygamous, pink to roseate, (4)5(6)-parted. Perianth valvate in bud. Calyx gamosepalous, minute, the lobes barely toothed. Corolla gamopetalous, funnelform, deeply lobed usually to about the middle. Stamens (8)10(13); the filaments free or very nearly so, long exserted, anthers minute. Ovary sessile or nearly so. Legume short to elongate, tetragonal or sometimes compressed, non-septate, dehiscent.

A genus of reputedly 25 or so species from tropical and warm-temperate America. (Name commemorates Franz Paula von Schrank, professor of Botany at Munich, 1747-1835).

1. *SCHRANKIA MICROPHYLLA* (Soland. ex Smith) Macbr., Contr. Gray Herb. n.s. 59:9. 1919.

Mimosa microphylla Soland. ex J. E. Smith, Georgia Insects 2: 123, pl. 62. 1797.

S. angustata T. & G., Fl. N. Am. 1: 400. 1840.

Morongia angustata (T. & G.) Britt., Mem. Torrey Club 5: 191. 1894.

Morongia microphylla (Soland. ex J. E. Smith) Britt. ex Britt. & Brown, Ill. Fl. ed. 2, 2: 334. 1913.

Leptoglottis microphylla (Dryland.) Britt. & Rose, N. Am. Fl. 23: 142. 1928.

Perennial with prostrate, arching, or decumbent, glabrous or more commonly minutely puberulent, conspicuously ribbed stems often about 1-2 m long and usually bearing numerous recurved prickles. Stipules setaceous, 3-8 mm long, inconspicuous. Petiole slender, ridged, prickly, about 2-5 cm long. Rachis and rachilla slender, about 1 mm in diameter, ribbed and prickly. Pinnae about 6-16 per leaf, about 2-5 cm long with stalk about 1-3 mm long; leaflets numerous, about 20-32, oblong-linear, about 2-8 mm long, obtuse to acute, the mid-vein alone usually visible beneath and venation otherwise inconspicuous and not forming an elevated reticulum, glabrous or nearly so on both surfaces but the margins minutely ciliate. Peduncles 2-5(7) cm long, slender, ribbed, with few to numerous, hooked prickles. Heads about 2 cm in diameter, flowers numerous and compactly clustered, pinkish. Calyx gamosepalous, about 0.5 mm long, the lobes minute. Corolla gamopetalous, funnelform, about 3 mm long; the tube 1.5-2 mm long; the lobes 1-1.5 mm long, acute. Filaments slender, glabrous, 7-10 mm long or about 2-3-times as long as the corolla, separate almost to base, the staminal tube only about 0.2-0.5 mm long. Legume more or less 4-sided, very prickly, tapering to both ends, usually minutely puberulent, about 5-10 (14) cm long and about 3-5 mm thick.

DISTRIBUTION: Open often sandy or clay soils from Virginia and Kentucky south to Texas and Florida.

Two additional species of SENSITIVE BRIER have been attributed to the flora of North Carolina. These are *Schrankia uncinata* Willd. [= *S. Nuttallii* (DC.) Standl.] and *S. Chapmanii* (Small ex Britt. & Rose) Hermann (Jour. Wash. Acad. 38: 237. 1948). The first of these species, *S. uncinata*, is easily distinguished by the conspicuously reticulate venation on the lower surface of the leaflets. No specimens of it have as yet been seen from North Carolina and it should not be included in the Carolina flora until specimens of it are found. *Schrankia Chapmanii* is apparently not so easily recognized and the characters which have been used to distinguish it in the past are to be found only in fruiting specimens. It is distinguished from *S. microphylla* in

Small's Manual where both are treated under the name *Leptoglottis* as follows:

Legume mostly 9-15 cm long, much longer than the peduncle, slender, long-beaked, not densely prickly and the prickles of the peduncle not conspicuously widened at the base *L. microphylla*.

Legume mostly 3.5-8 cm long, about as long

as the peduncle or somewhat longer, stout, densely prickly and the prickles of the peduncle conspicuously widened at the base *L. Chapmanii*.

If more than one species is present in North Carolina, I am at present unable to distinguish them and hence all our material is here referred to *S. microphylla*.

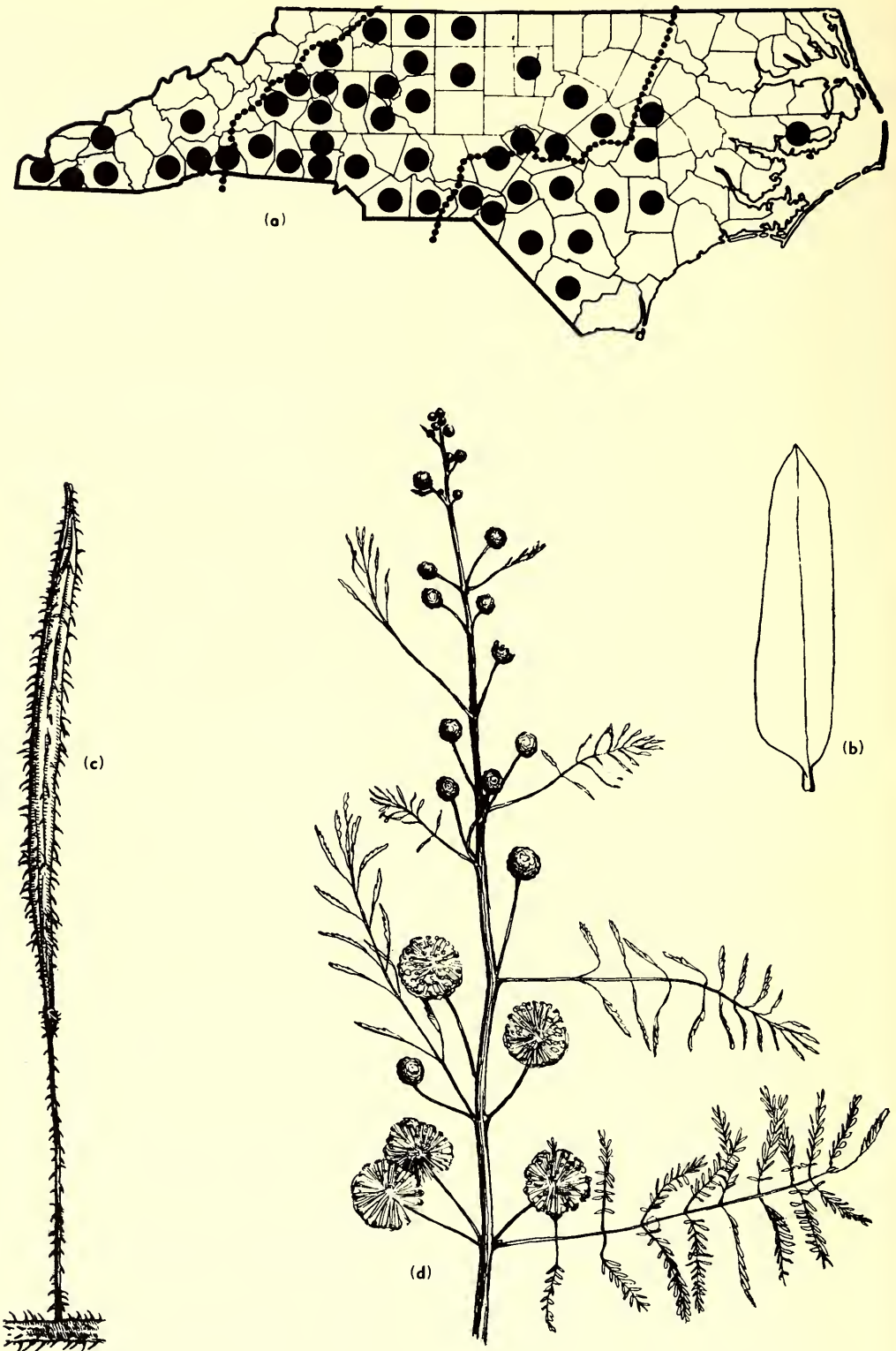


Fig. 2. *Schrankia microphylla*. (a) Distribution; (b) Leaflet; (c) Fruit; (d) Habit sketch and flower clusters.

Subfamily II. CAESALPINIOIDEAE

The family Caesalpiniaceae or Cassiaceae
of many authors.)

Trees, shrubs or herbs with simple or 1-2-pinnately compound, alternate, stipulate leaves usually lacking stipels. Flowers perfect or unisexual, irregular to nearly regular. Hypanthium usually present and often well-developed. Calyx typically 5-parted, polysepalous or gamosepalous. Petals usually 5, imbricate, the upper or adaxial enclosed in bud by the lateral. Stamens mostly 5-10, rarely fewer or more numerous; filaments distinct or more rarely somewhat united; anthers usually opening by longitudinal slits or more rarely by terminal pores. Ovary sessile or with a stalk more or less attached to the receptacle. Endosperm usually abundant and embryo straight.

Perhaps 120 genera (135 according to Lawrence but only 60 by Gleason) and 2200 species; chiefly tropical in distribution.

1. Leaves simple; flowers appearing before the leaves; petals pink to deep rose or even red 3. CERCIS.

1. Leaves pinnately compound; flowers appearing with or after the leaves; petals yellow or greenish white.

2. Herbs (in our species); leaves 1-pinnately compound; petals (in ours) yellow or rarely white; anthers opening by terminal pores; perinath divided to or nearly to the base 4. CASSIA.

2. Trees; leaves 1-2-pinnately compound; petals greenish white; anthers opening by longitudinal slits; sepals and petals joining a conspicuous floral tube.

3. Leaves 2-pinnately compound, the leaflets entire, most wider than 1.5 cm, acuminate; trunk and branches thornless; legume thick and woody ... 5. GYMNOCLADUS.

3. Leaves 1-2-pinnately compound, leaflets crenulate, mostly less than 1.5 cm wide, obtuse; trunk or branches usually bearing conspicuous thorns; legume flat, thick-papery or leathery ... 6. GLEDITSIA.

3. CERCIS L., Sp. Pl. 374. 1753; Gen. Pl. ed. 5. 176. 1754.

Unarmed small trees or shrubs. Stipules ovate, small, membranous, caducous. Leaves long-petiolate, deciduous, entire, palmately veined, cordate to reniform. Flowers pedicellate, fasciculate or racemous, borne on branches of the preceding year or years, appearing before (in ours) or with the leaves. Hypanthium and calycine tube colored, persistent, both oblique at base, broadly and irregularly cam-

panulate, enlarged on the lower side, the 5 calyx-lobes short and broadly triangular. Corolla appearing vaguely papilionaceous; petals 5, nearly equal, pink to red, oblong-ovate, clawed, the upper petal (the "standard") smallest and enclosed in bud by the lateral petals (the "wings") and encircled by the two "keel" petals. Stamens 10; filaments free, persisting while fruit matures; anthers all fertile, versatile, 2-celled, opening longitudinally. Stigma terminal and knob-like. Ovary shortly stalked. Legume slightly stipitate, oblong to broadly linear, acute at both ends, compressed, many-seeded, two-valved, tardily dehiscent.

A genus of perhaps 8 species; one in eastern North America with perhaps 2 varieties in the Texas-Mexico area, another species in California and the Southwest, 5 other species are reported as natives of China with another occurring in southern Europe and western Asia. (The name from the Greek *Kerkis*, thought to be ancient name of the Judas-tree, *Cercis Siliquastrum* L.)

1. CERCIS CANADENSIS L., Sp. Pl. 374. 1753.

A small tree mostly 5-10(13) m high or perhaps more with straight trunk dividing at maturity into stout branches 2-4 m above the ground and forming a compact, rounded to occasionally flat-topped crown. Bark dark gray to brownish. Branches slender, glabrous, somewhat geniculate and with conspicuous lenticels. Leaves broadly cordate or reniform, dull green on both surfaces, not shining, palmately 7(9)-veined, 6-15 cm broad, 5-10 cm long, base cordate to subtruncate, apex acute or abruptly contracted into a short, broad point, turning bright yellow in autumn. Petioles 3-5 cm long. Inflorescence a sessile cluster of 2-6 flowers borne on old wood prior to the leaves or along with their unfolding. Hypanthium about 1-2 mm long, roseate to dark red, slightly compressed and somewhat oblique. Calyx very conspicuously irregular, reddish or roseate; the tube 2-3 mm long; the calyx-lobes obtusely triangular-dentate, about 0.4-0.6 mm long. Corolla vaguely papilionaceous in aspect but with the uppermost petal within the two laterals and the lowermost two petals external in bud; the uppermost petal (the "standard") the smallest, its blade oblong and concave, about 6-8 mm long and 3.5-4.5 mm wide, the claw about 3-3.5 mm long; the "wings" or lateral petals large with both the broadly oblong blade and the slender claw averaging

about 1 mm longer; the lowermost or "keel" petals largest with an irregularly more or less ovoid to cordate blade about 7.5-9 mm long and a very slender, somewhat curved claw about 1.5-2 mm long; the petals varying from deep roseate to pale pink (or rarely even white) dependent partly upon maturity. Flowering pedicels 6-12(14) mm long, glabrous, usually deeply roseate or resembling the calyx in color, bearing two fugacious, inconspicuous, brownish- to blackish-tipped, lanceolate bracts near base about 1.5-2 mm long; fruiting pedicels 9-14 mm long. Legumes usually numerous, oblong in general aspect but tapering to both ends; very greatly compressed, the venation elevated and clearly visible; calyx and filaments often long-persistent about the somewhat stipitate base; the fruit about (4)6-8(10) cm long and 8-18 mm wide with a conspicuous wing of about 1-3 mm width along the upper suture.

DISTRIBUTION: The typical variety (*C. canadensis* var. *canadensis*) alone is to be found in North Carolina and widespread in eastern North America from southern Connecticut and New York west including the extreme southern tip of Ontario, Michigan, Iowa, eastern Nebraska and south through eastern Texas into northeastern Mexico.

The REDBUD or JUDAS TREE is very abundant throughout the Piedmont and lower mountainous area of North Carolina, and perhaps for that very reason poorly represented in our herbaria. Apparently rare in the Coastal Plain. A minor variation *C. canadensis* f. *glabrifolia* Fern., characterized by possessing completely glabrous leaves at maturity, is represented by several collections. The pubescence on the typical form at maturity is usually restricted to the principal veins in the immediate vicinity of the sinus.

4. CASSIA L., Sp. P1. 376. 1753; Gen. P1. ed. 5. 178. 1754.

- Chamaecrista* Moench, Meth. 272. 1794.
- Ditremexa* Raf., Sylva Tell. 127. 1838.
- Emelista* Raf., Sylva Tell. 127. 1838.

Trees, shrubs or herbs (the latter in all of ours) with evenly once-pinnately compound, stipulate leaves (rarely aphyllous) usually bearing one or more glands on the petiole or rachis. Flowers perfect, usually somewhat irregular, solitary or clustered in axillary racemes or terminal panicles and subtended by bracts and bractlets. Calyx with a short, in-

conspicuous tube and 5, usually imbricate, often slightly unequal lobes. Petals 5, usually somewhat unequal, yellow in ours, but elsewhere occasionally red, pink or white. Stamens 5 or 10, often unequal, when 10 often a few aborted and sterile; anthers basally attached and opening by two apical or basal pores. Ovary central, often curved or declinate, sessile or stalked. Legumes few to many seeded, often septate, flattened to terete and exceedingly variable as to structure, texture, etc.

A genus of perhaps 500 species of the tropics and warm temperate regions of both hemispheres. (Name derived from the Greek *cassia*, the name of an ancient spice.)

Britton and Rose in their radical publication concerning this group treated the North American species as members of 28 genera of which three are represented in our flora. In recent years certain of these segregates have again received favorable consideration as being worthy of generic rank. The merit of the *Chamaecristas* to such status has been particularly favored (e.g. Isely: 1958, p. 369) overemphasizing the preliminary and very guarded statement by Senn (1938) that the polyploid series with the unique base number of 8 within this group of species "seems to provide some evidence in support of the maintenance of this group of species as a valid genus." Irwin and Turner (1960) in an interesting and most important paper, have done much toward providing the broad cytological survey indicated by Senn as necessary before any "far reaching conclusions" should be drawn. Irwin and Turner concluded that the *chamaecrista* *Cassias* do not merit generic rank and that in general the chromosomal relationships support the basic soundness of Bentham's treatment (1871).

- 1. Leaflets not sensitive, usually more than 2.5 cm long and 7 mm wide; petiole more than 1 cm long; leaves usually more than 10 cm long, stipules deciduous; anthers partly imperfect; legume usually more than 7 cm long, not elastically dehiscent.
- 2. Petiolar gland between or just above the lowest pair of leaflets; leaflets usually 2-3 pairs, broadset above the middle; legume 4-sided, not flattened, 3-5 mm wide
..... 1. *C. obtusifolia*.
- 2. Petiolar gland well below the lowest pair of leaflets and near base of petiole; leaflets mostly 4 or more pairs, broadest near the middle or below; legume compressed, 5-11 mm wide.

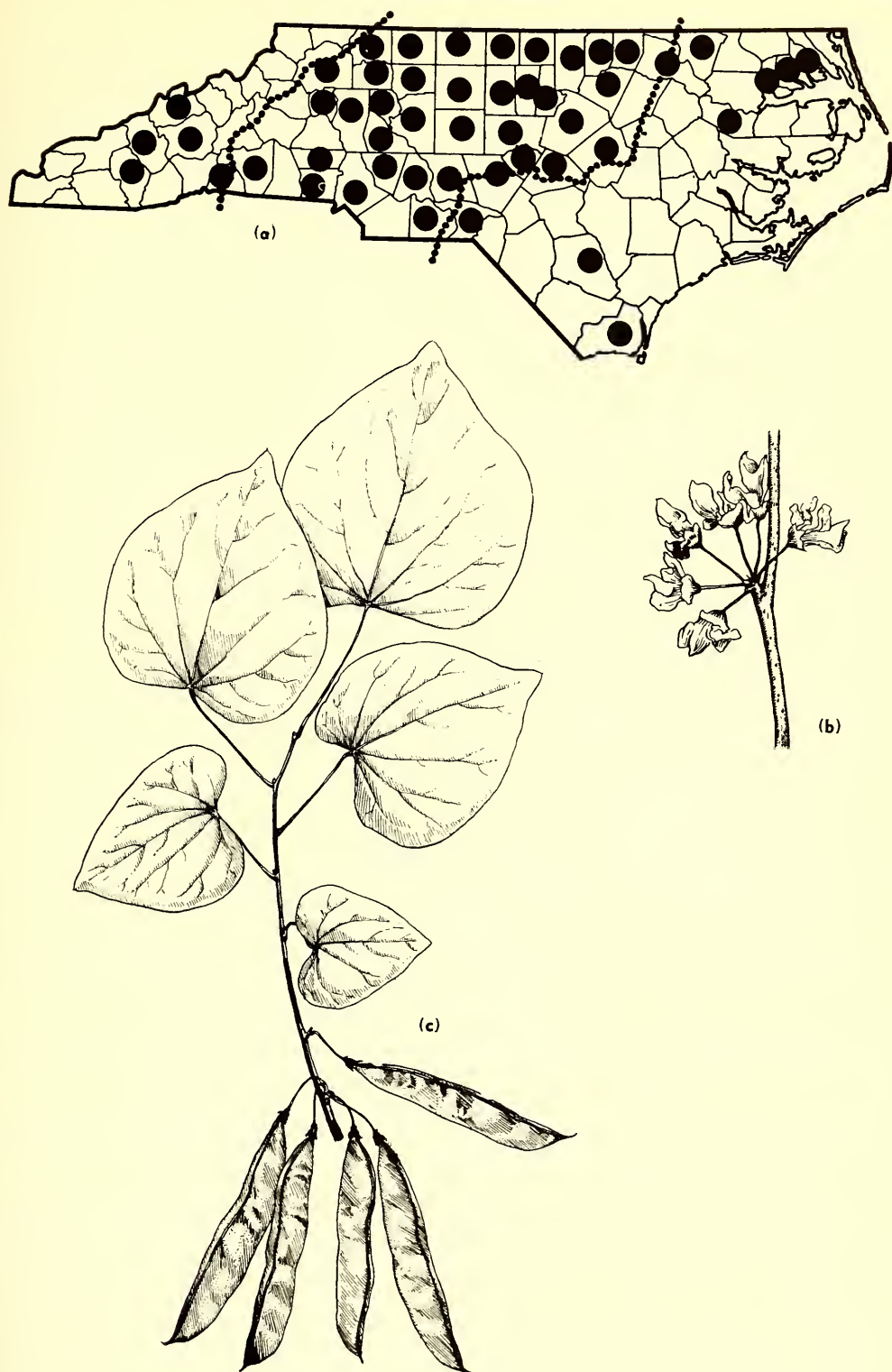


Fig. 3. *Cercis canadensis*. (a) Distribution; (b) Flower cluster; (c) Leaves and fruit.

3. Leaflets conspicuously acuminate, ovate or ovate-lanceolate, 3-6 pairs per leaf; flowers 3 or fewer per axil 2. *C. occidentalis*.
3. Leaflets acute to obtuse, oblong or elliptic, 5-10 pairs per leaf; flowers often many in axillary or terminal clusters, usually more than 3 per axil.
4. Ovary densely long-villous with spreading hairs; segments of legume as long as wide or nearly so; seeds quadrate-orbicular, compressed, about 1 mm thick; petiolar gland club-shaped, typically short-stalked 3. *C. hebecarpa*.
4. Ovary short-hirsute with closely appressed hairs; segments of legume much shorter than wide; seeds oblong-obovoid, plump, about 2 mm thick; petiolar gland subglobose, typically sessile or nearly so 4. *C. marilandica*.
1. Leaflets sensitive to touch, typically less than 2.5 cm long, never longer, and 6 mm or less wide; petiole less than 1 cm long; leaves less than 10 cm long; stipules persistent; anthers all perfect; legume less than 7 cm long, elastically dehiscent.
5. Petiolar gland saucer-shaped, sessile or nearly so, or at least thick-stalked; petals more than 1 cm long; sepals 9 mm long or more; pedicels 1 cm or more in length; anthers 10, the longest more than 4 mm long (usually about 8 mm) and 2 or more times as long as its filament 5. *C. fasciculata*.
5. Petiolar gland umbrella- or mushroom-shaped, slender-stalked; the longest petal about 8 mm long or less, the rest about half as long; sepals 4 mm long or less; pedicels less than 5 mm long; anthers 5, the longest less than 4 mm long and less than twice as long as its filament 6. *C. nictitans*.

1. CASSIA OBTUSIFOLIA L., Sp. Pl. 377.
1753.

C. Tora in the sense of most American authors and in part of Bentham (Trans. Linn. Soc. Lond. 27:535 & 536. 1871) but not of L., Sp. Pl. 376. 1753.

Emelista Tora in the sense of Britt. & Wils., Sci. Surv. Porto Rico & Virgin Isl. 5:371. 1924 but not of the Linnean basionym.

Annual herb up to about 1.5 m high, glabrous or nearly so. Stipules linear, acute, ciliate, 0.8-1.5 cm long, about 1-1.5 mm wide, tardily deciduous, striate. Petiole (1)2-5(6) cm long, about 2 mm in diameter, ribbed.

Leaflets 4-6, most commonly 6, thin, the terminal pair the largest, the basal pair the smallest, obovate, broadly obtuse, entire, mucronate, ciliate, glabrous on both surfaces or sometimes puberulent beneath, (2)3-6(7) cm long, 2-4 cm wide, base slightly oblique, petiolules mostly 1-2 mm long. Elongate gland about 2 mm long between or just above the two lower leaflets on the upper side of the rachis. Flowers in the axils of the upper leaves, solitary or commonly two (rarely more) borne on a common peduncle of about 1.2-3.5 cm long. Sepals ovate to oblong, membranous, ciliate, glabrous to puberulent, unequal, mostly 5-8(10) mm long and 2-5 mm wide. Petals yellow, obovate, 8-17 mm long, 5-10 mm wide. Perfect stamens 6-7 with thickened anthers about 2-6 mm long which narrow just below apex, and with slender filaments about 2-5 mm long. Staminodes 3-4 with conspicuously aborted anthers. Legume on pedicel 1.5-4.5 cm long, narrowly linear, slender, usually strongly falcate, 10-15 (20) cm long, 3-5 mm wide, glabrous, tetragonal or nearly so, dehiscent along both sutures. Seeds numerous, large, about 5 mm thick and bearing a diagonally striped, narrow, linear areole along both sides.

DISTRIBUTION: Pennsylvania south to Florida, west to Texas and Mexico and north to east Kansas, Illinois, and Michigan. Thought to be a native of the American tropics. All collections of SICKLE-POD from North Carolina apparently came from weedy, disturbed areas and apparently casually introduced with soybean or other crops.

The distinctions between this species and *C. Tora*, with which it has long been submerged, are fully discussed by Brenan (Kew Bull. 13: 248-252. 1958) who also considered the nomenclatural basis of the names for both species.

2. CASSIA OCCIDENTALIS L., Sp. Pl.
377. 1753.

Ditremexa occidentalis (L.) Britton & Wilson, Sci. Surv. Porto Rico & Virgin Isl. 5:372. 1924.

Erect annual (at least in our range) herb up to 1(2) m high, glabrous or nearly so. Stipules narrowly to broadly lanceolate, entire, glabrous, not ribbed, acute, soon deciduous, 4-6 mm long. Leaves mostly 2-3 dm long. Petiole (2)3-5(7) cm long. Petiolar-gland 3-5 mm from base, sessile, globose, about 1-1.5 mm in diameter. Leaflets usually 8-12, ovate or ovate-lanceolate, acuminate to acute, (2)3-7(9) cm long, about 1.5-3 cm wide, entire,



Fig. 4. *Cassia obtusifolia*. (a) Distribution; (b) Habit sketch with fruit.

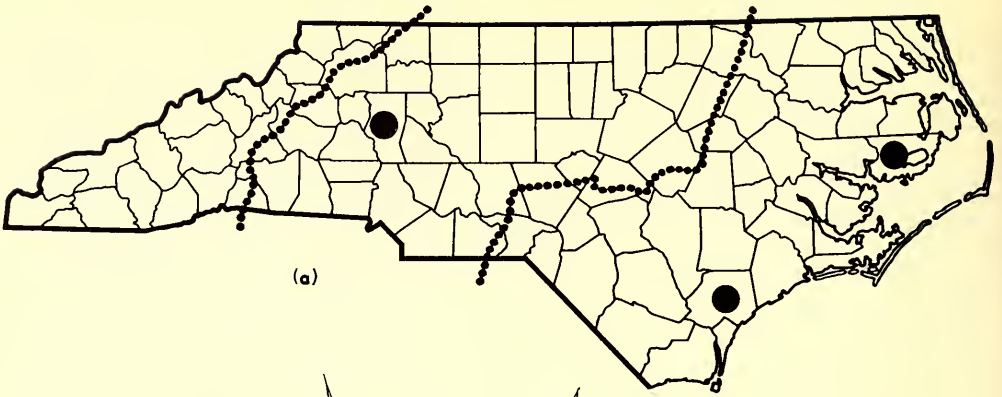


Fig. 5. *Cassia occidentalis*. (a) Distribution; (b) Habit sketch with flowers and fruit.

ciliate, equal or nearly so at base. Petiolule about 1-2 mm long. Flowers solitary in axils of the upper leaves or borne in few-flowered racemes borne on short peduncle and subtended by caducous, lanceolate bracts. Sepals entire, glabrous, oblong to ovate, obtuse, 6-9 mm long. Petals yellow, spatulate to obovate, 1-2 cm long, usually about twice as long as the sepals, variable in shape. Perfect stamens 6-7, often of two distinct sizes; the two larger with both anthers and filaments about 6 mm long; the four smaller with anthers about 3-4 mm long, their filaments about 2 mm long. Sterile stamens 3-4, varying in size, the abortive anthers flattened. Style glabrous, ovary puberulent. Legume linear, about 8-14 cm long and 5-9 mm wide, straight or somewhat curved, glabrous to short-puberulent, compressed but about 1 mm thick, the margins thickened, dehiscing along both sutures, externally conspicuously segmented by oblique depressions. Seeds said to be pale brown, flattened-ovoid, 4-5 mm long.

DISTRIBUTION: Pennsylvania to Iowa and south to Texas and Florida. Tropical American and in the Old World tropics as well. Original range uncertain: said by Benthams (1871:532) to be probably of American origin but Gleason (2:384. 1952) attributes it to the Old World tropics. In any event COFFEE SENNA is not native to our area.

Only three collections of this plant have been seen from North Carolina and it is very questionable whether this plant is naturalized within the state. All collections were from cultivated areas.

3. CASSIA HEBECARPA Fern., *Rhodora* 39:413. 1937.

C. marilandica in the sense of most American authors between 1904 and 1937 but not L.

Ditremexa marilandica according to Britt. & Rose, N. Am. Fl. 23(4):25. 1930.

Herb (6)8-12(20) dm high arising from a perennial, wide-spreading, thick, woody rhizome. Glabrous to sparsely villous above. Stipules caducous, linear, subulate, ciliate, 6-10 mm long. Leaves usually 10-20 cm long. Petiole usually about 5-10 cm long with petiolar gland mostly 2-3 mm long located about 3-15 mm from the base of the petiole, more or less club-shaped with a short stalk-like base. Leaflets (10)12-18(20), elliptical to oblong or oblong-lanceolate, acute to obtuse, mucronate, unequally rounded at base, with slightly revolute, ciliate to glabrate margins, 2-5 cm long, and

about (8) 10-18 mm wide. Petiolules about 1-2 mm long. Inflorescences borne in the axils of the upper leaves, sometimes appearing terminally paniculate, racemes often many-flowered, bracts linear-subulate, caducous, about 1 cm long. Sepals ovate to oblong, obtuse, thin, ciliate, usually glabrous, about 6-8 mm long and 3-5 mm wide attached to the short hypanthium. Petals bright yellow, almost equal; obovate to spatulate, obtuse, about 10-12 mm long. Stamens 10, the upper 3 sterile, their anthers flattened and empty; the fertile stamens of unequal size, the larger about twice as large as the rest; anthers brown, the filaments as long or nearly as long as the anthers. Style glabrous. Ovary 6-9 mm long, densely covered with long, pale, villous-spreading hairs. Legume linear, straight to somewhat curved, strongly compressed, about 6-12 cm long and 5-8 mm wide, sparsely pubescent to glabrate, readily dehiscing along both sutures, the segments clearly indicated by narrow depressions, joints as long as broad or nearly so. Seeds flat, quadrate-orbicular, about 4-5 mm in diameter and 1 mm thick, each side with a shallow depression.

DISTRIBUTION: Massachusetts to Wisconsin and south to Tennessee, North Carolina, and Georgia.

Fernald demonstrated (*Rhodora* 39: 410-414. 1937) that, although Linnaeus' *C. marilandica* was based upon two species, the name of the species actually should be typified by the specimen examined by Linnaeus and still represented by a specimen in the Linnean Herbarium. It ought not be typified by the plants referred to in the cited literature. Fassett (1939, p. 23) argued that *C. marilandica* was typified according to the "doctrine of residues" by the element not present in Linnaeus' collection when Shafer named *C. Medsgeri* and thus in effect removed the species from the mixed Linnaean concept that was actually best known to Linnaeus. The International Code supports Fernald's procedure and not Fassett's arguments. Both of these species share the same common name, WILD SENNA, which is only fitting for plants so recently distinguished by taxonomists.

4. CASSIA MARILANDICA L., Sp. Pl. 378. 1753.

C. Medsgeri Shafer, *Torreyia* 4:179. 1904.

Ditremexa Medsgeri (Shafer) Britt. & Rose, N. Am. Fl. 24(4): 257. 1930.

Perennial herb 7-15(20) dm high, glabrous

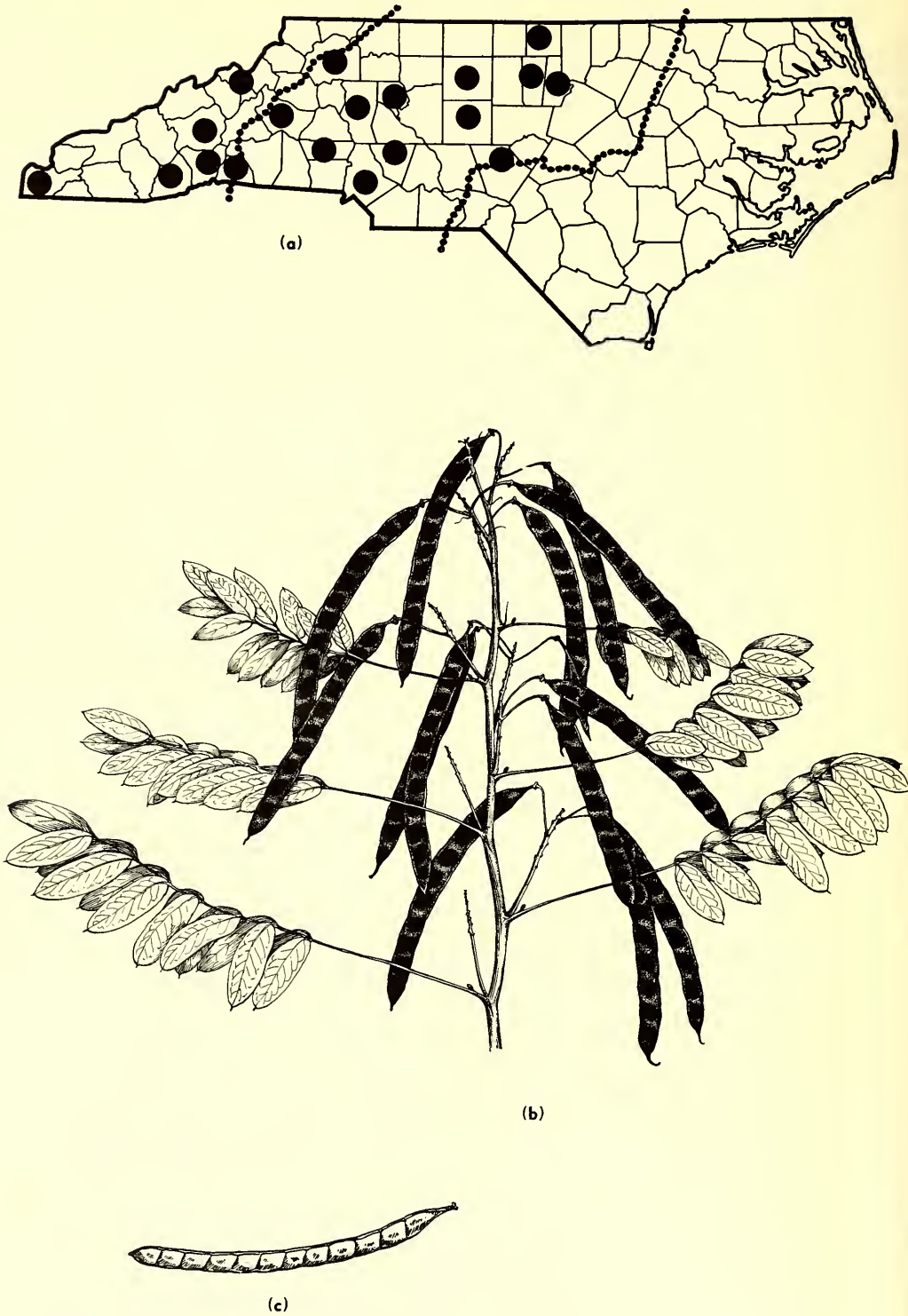


Fig. 6. *Cassia hebecarpa*. (a) Distribution; (b) Habit sketch with fruit; (c) Fruit.

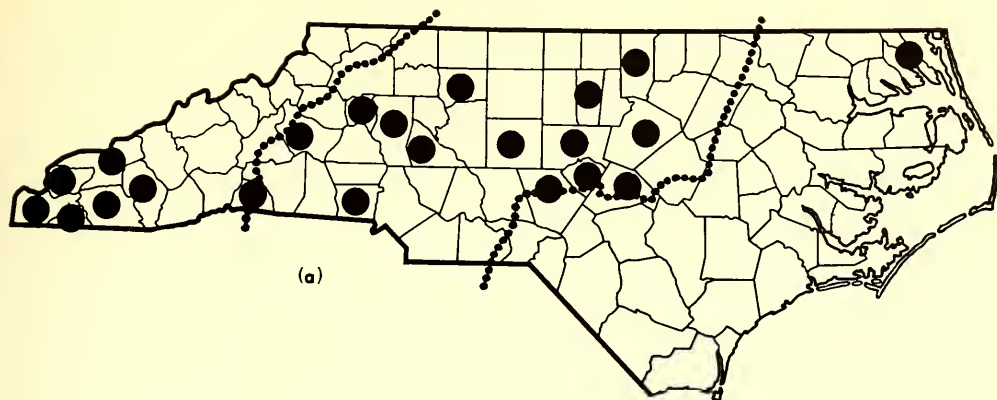


Fig. 7. *Cassia marilandica*. (a) Distribution; (b) Habit sketch with fruit; (c) Fruit.

or very nearly so throughout. Stipules caducous, linear-lanceolate, glabrous or nearly so, about 7-10 mm long and 1 mm or less wide. Leaves about 10-20 cm long. Petiole about 5-10 cm long with petiolar gland mostly 1-1.5 mm long and located about 3-10 (15) mm from the leaf-axil, ovoid or subglobose, sessile or nearly so or slightly constricted at base. Leaflets (8) 12-18 (22), oblong, elliptic or elliptic-lanceolate, acute or obtuse, mucronate, slightly but still noticeably oblique at base with revolute, glabrous or rarely ciliate margins, about 2-6 cm long and 7-20 mm wide. Petiolule about 2 mm long. Inflorescence of few-flowered axillary racemes or forming a terminal, paniculate cluster. Sepals oblong to ovoid, obtuse, thin, ciliate, 5-8 mm long and about 4 mm wide, attached to the short hypanthium. Petals yellow, almost equal, broadly spatulate, obtuse or more rarely acute, 9-15 mm long. Stamens 10, the upper 3 sterile, their anthers empty; the fertile stamens of unequal size, the largest 10-12 mm long and about three-fourths to once again as large as the smallest; filaments about as long as their anthers. Ovary about 5-8 mm long, densely short-hirsute with closely appressed hairs. Legume broadly linear, straight or curved, 5-10 cm long, 8-11 mm wide, about 3 mm thick, tardily dehiscent, the segments clearly delineated by narrow depressions, joints much shorter than broad, glabrous or sparingly short-pubescent. Seeds plump, oblong-obovoid, about 4 mm long, about twice as long as thick with a shallow depression on each side.

DISTRIBUTION: Pennsylvania to Iowa and eastern Kansas south to Florida and Texas.

Peattie (Jour. Elisha Mitch. Sci. Soc. 45: 60. 1929) reported *C. ligustrina* from the Tryon region on the authority of specimens so identified by J. N. Rose. Small lists this species only from Florida. I have seen several of Peattie's specimens (no. 1146) labeled *C. ligustrina* from "western North Carolina" and they are *C. marilandica*. Therefore it seems unwarranted to include *C. ligustrina* as a member of our flora.

The common name of this plant, like that of *C. hebecarpa*, is WILD SENNA.

5. *CASSIA FASCICULATA* Michx., Fl. Bor. Am. 1: 262. 1803.

Chaemaecrista fasciculata (Michx.) Greene, Pittonia 3: 242. 1899.

Chamaecrista robusta (Pollard) Heller, Cat. N. Am. Pl. ed. 2. 5. 1900.

Cassia fasciculata var. *robusta* (Pollard) Macbr., Contr. Gray Herb. n.s. 59: 24. 1919.

Annual, erect, or ascendent, often much-branched herb about (1.5)3-6(15) dm high and the stem about 1-3 mm in diameter with a taproot. Stem and branches rarely glabrate or nearly so, but usually densely puberulent with incurved ascending short hairs or occasionally with numerous wide-spreading villous hairs up to 2 mm long in addition to the incurved puberulence. Stipules persistent, many-nerved, narrowly linear to lanceolate, attenuate, more or less glabrous except for the marginal cilia, mostly 5-10 mm long. Leaves sensitive, mostly (2)3-6(9) cm long. Petiole usually 4-8(10) mm long. Petiolar gland solitary, borne on upper side of petiole near the middle or a little beyond, sessile or nearly so, depressed, saucer-shaped, round to somewhat oval in outline from above, brown to dark brown, mostly 0.5-1.5 mm in diameter. Leaflets numerous, about 12-30(36), about 10-20(25) mm long and (2)3-5(6) mm wide, linear-oblong, acute to obtuse, mucronate, inequilateral, sessile, glabrous or nearly so but margins minutely ciliate. Bracts lanceolate, attenuate, finely striate, 3-5(6) mm long. Flowers in axillary fascicles of 1-4(6) forming short, bracteolate racemes. Pedicels slender, about 1-2 cm long, rarely glabrate, commonly appressed-puberulent or sometimes also with spreading hairs. Sepals about 9-12 cm long, lanceolate, acute, glabrous, puberulent or densely villous along the midvein. Petals obovate, usually bright yellow, almost equal in size, about 1-2 cm long. Stamens 10, unequal, anthers about 9-12 mm long, yellow to reddish; filaments about 1 mm long. Style slender, glabrous, 6-10 mm long. Legume mostly 3-5(7) cm long, 5-7 mm wide, glabrate, appressed-puberulent to villous. Seeds 4-12, tabular, blackish, pitted with minute, rounded depressions.

DISTRIBUTION: Massachusetts to South Dakota and south to Florida and Texas.

It seems to me unwise, for the present at least, to distinguish taxonomically between any of the variations noted within the specimens of PARTRIDGE-PEA studied. In the past those plants possessing wide-spreading hairs upon their stems and sepals have been designated *C. fasciculata* var. *robusta* (Pollard) Macbr. (= *C. robusta* Pollard). Within our area at least, there is neither geographical nor apparently ecological segregation of this or any of the other forms noted. The villous-stemmed spec-

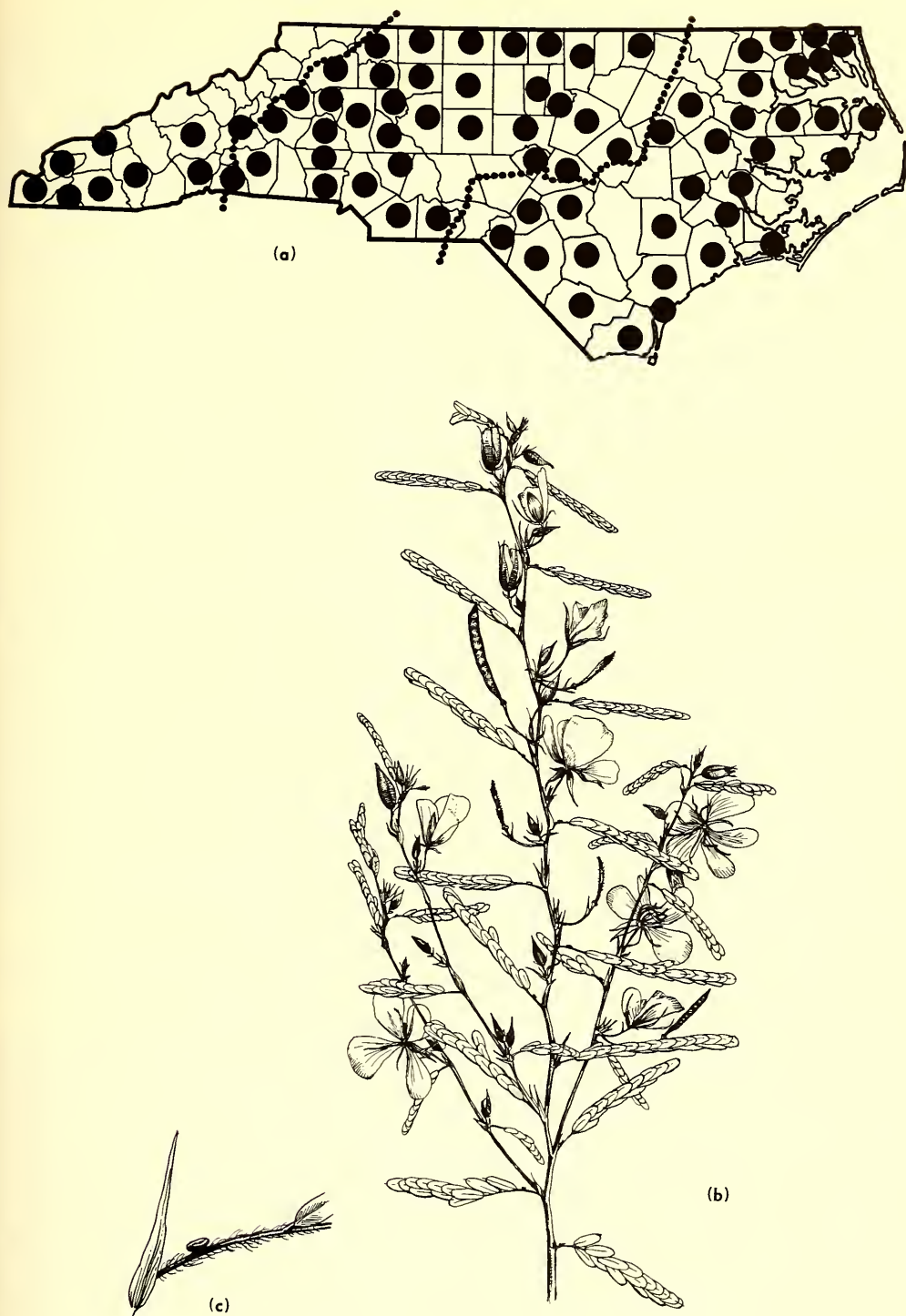


Fig. 8. *Cassia fasciculata*. (a) Distribution; (b) Habit sketch with flowers; (c) Stipule and petiolar gland

imens are found in the Mountains, Piedmont, and Coastal Plain. An additional variant, which apparently has not been formally named, is similar to those specimens which are considered to be the typical element of the species except that it possesses completely glabrous sepals. Plants possessing this characteristic are known from all three provinces in the state but are decidedly more frequent in the Coastal Plain.

Turner (Field and Lab. 23: 87-91. 1955) has studied the variations encountered in Texas of this species and recognized var. *robusta* and four other varieties. The entire complex could most profitably be studied intensively.

6. CASSIA NICTITANS L., Sp. Pl. 380. 1753.

Chamaecrista nictitans (L.) Moench., Meth. 272. 1794.

Cassia procumbens L., Sp. Pl. 380. 1753.

Chamaecrista procumbens (L.) Greene, Pittonia 4: 28. 1899.

Cassia multipinnata Pollard, Bull. Torrey Club 22: 515. 1895.

Chamaecrista multipinnata (Pollard) Greene, Pittonia 3: 243. 1897.

Annual, erect, or rarely diffusely spreading, often much-branched herb usually 1-3(5) dm high with stem 1-3 mm in diameter and often with a pronouncedly developed taproot. Stem and branches glabrous or nearly so, or more commonly densely appressed-puberulent with short incurved hairs. Stipules persistent, lanceolate, attenuated into a subulate tip, about 4-7(8) mm long, glabrous, ciliate, 3-5-striate. Leaves sensitive, mostly 3-6(7) cm long. Petiole usually 4-9 mm long and puberulent. Petiolar gland single, slender-stalked, appearing mushroom- or umbrella-like, usually 0.4-0.8 mm in diameter, typically about 2-3 mm below the lowest leaflets, round, dark brown. Leaflets numerous, mostly (7)10-18(22) pair, narrowly linear to linear-oblong, inequilateral, the midvein nearer the upper margin, usually (6)8-12(15) mm long, (1)1.5-3(4) mm wide, obtuse, mucronate, not ciliate, glabrous, sessile or nearly so. Bracts subulate, striate, ciliate, about 1.5-2.5 mm long. Flowers solitary or up to 3 borne together in a short raceme. Pedicels very short, 1-4 mm long, glabrate or more commonly short-puberulent. Sepals 3-4 mm long, lanceolate, acuminate, usually puberulent. Petals obovate, bright yellow, unequal, the ventral or abaxial about 6-8 mm long and about twice as large as the others. Stamens

5, unequal; anthers about 1-2 mm long, pinkish; filaments short, 1-1.5 mm long. Style thickish, less than 1 mm long, glabrous. Legume 2-4 cm long, (3)4-6 mm wide, rarely glabrous or glabrate, usually densely appressed-puberulent. Seeds mostly 6-9, tabular, blackish, about 3 mm long, faintly pitted with rows of round depressions.

DISTRIBUTION: Southern Vermont to Missouri south to Southern Georgia and Texas.

From the material available, it seems unwise to attempt maintaining *C. multipinnata* Pollard as an entity distinct from *C. nictitans*. It has been distinguished in the past by the numerous (15-26 pairs), slender (1-2 mm) leaflets in contrast to the 9-18 pairs of broader leaflets in typical *C. nictitans*. This variant seems to be only an extreme form.

A few glabrous-fruited specimens have been seen from North Carolina. These have been called *C. nictitans* var. *leiocarpa* Fern. in recent treatments and previously reported only from Kentucky and Indiana. The range attributed to *C. nictitans* var. *hebecarpa* Fern., a variant characterized by villous fruits and stems, includes coastal North Carolina. Specimens with this fruit-type are represented in the local herbaria from both Dare and Brunswick Counties. Neither the glabrous nor villous-fruited plants of WILD SENSITIVE PLANT seem to me to represent true geographical varieties.

5. GYMNOCLADUS Lam., Encycl. Méth. Bot. 1: 733. 1785.

Large dioecious or polygamous trees with thick unarmad branches and rough, deeply fissured bark. Leaves deciduous, twice-pinnate and large with foliaceous, early deciduous stipules and ovate, entire, petiolulate, estipellate leaflets. Inflorescences terminal or axillary, that of the staminate plant paniculate, that of the pistillate plant racemous. Flowers regular, greenish white, long-pedicellate. Pedicels slender, subtended by long, lanceolate, scarious, caducous bracts and bearing two minute bractlets. Hypanthium tubular, elongate, 10-ribbed, glandular, with 5, lanceolate, acute, almost equal, erect calyx-lobes. Petals oblong, acute to obtuse, pubescent, about twice as broad as the calyx-lobes and as long or a little longer, inserted on the edge of the hypanthium, spreading or reflexed. Stamens 10, in-

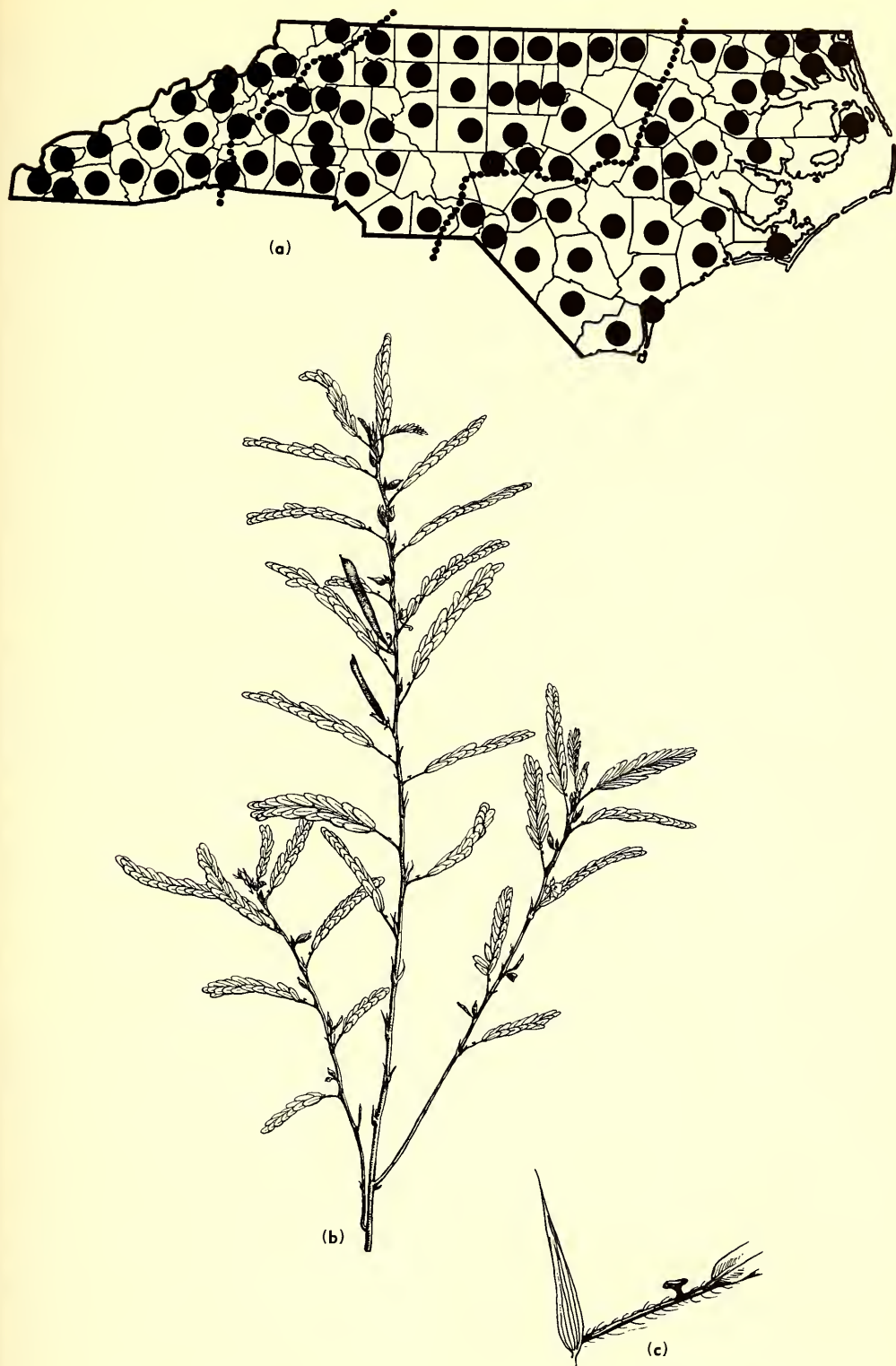


Fig. 9. *Cassia nictitans*. (a) Distribution; (b) Habit sketch with fruit; (c) Stipule and petiolar gland.

cluded, free, erect, inserted on the margin of the hypanthium; filaments slender, the longer opposite the calyx-lobes; anthers oblong, versatile, opening longitudinally; stamens shorter and sterile in pistillate flowers. Ovary sessile in the bottom of the hypanthium, rudimentary or lacking in the staminate flowers. Legume oblong, several-seeded, tardily dehiscent, woody, narrowly winged.

A genus of two species, the other found in China. (The name derived from the Greek, *gymnos* = naked and *clados* = branch, referring to the branches lacking twigs.)

1. *GYMNOCLADUS DIOICA* (L.) K. Koch,
Dendrol. 1: 5. 1869.

Tree up to 35 m or so high with trunk 6-9 dm in diameter usually soon separating into 3 or more principal branches which form a narrow pyramidal crown. Leaves large, 3-9 dm long, 3-6 dm wide, 10-14-pinnate the upper pinnae more greatly developed than the lower, the lowest pinnae reduced to single leaflets, the others 7-13-foliolate. Leaflets about 4.5-7 cm long and about 2-3 cm wide, those replacing the lower pinnae sometimes twice as large, ovate, acute to acuminate, in autumn turning bright yellow with entire, slightly revolute margins and petiolules 2-3 mm long. Staminate inflorescences about 7-11 cm long; its lower branches again branched. Pistillate inflorescences often 2-3 dm long with stout pedicels about 2-7 cm long. Hypanthium about 1-1.8 cm long, conspicuously 10-ribbed, pubescent; calyx-lobes 8-10 mm long, oblong. Petals externally pilose, internally densely puberulent, usually a little longer than the calyx-lobes and about twice as wide. Anthers orange. Legumes persistent and indehiscent throughout the winter (0.5)1-2(2.5) dm long, about 3-5 cm wide. Seeds about 1.5-2 cm long, ovoid, compressed, embedded in fleshy, sweet pulp.

DISTRIBUTION: Rich alluvial woods from central New York to eastern South Dakota and south to Oklahoma, Missouri and Tennessee. Commonly introduced in the east and sometimes becoming naturalized, principally spreading by root sprouts. The degree to which the KENTUCKY COFFEE-TREE has established itself in North Carolina is uncertain but apparently, if it does do so, it occurs but rarely.

6. *GLEDITSIA* L., Sp. Pl. 1056. 1753; Gen.
Pl. ed. 5. 476. 1754.

Asacara Raf., Neogenyton 2. 1825.

Trees or shrubs usually armed with sturdy, simple or branched thorns developed from

supra-axillary or adventitious buds. Leaves deciduous, alternate, or often fascicled, even 1- or 2-pinnate (often on the same plant). Stipules minute, caducous; stipels absent. Leaflets crenulate. Flowers polygamous, small, greenish, short-pedicellate, in axillary, simple or fascicled racemes. Bracts minute, caducous. Hypanthium campanulate; the sepals 3-5, narrow, equal or nearly so. Petals as many as the calyx-lobes (3-5), attached to the rim of the hypanthium, nearly equal. Stamens 3-10, inserted with the petals on the hypanthium, exerted; filaments separate and slender; anthers versatile and longitudinally dehiscent; those of the pistillate flowers smaller and abortive. Ovary attached at the base of the hypanthium, rudimentary or wanting in staminate flowers, partly exerted in the pistillate, nearly sessile or stipitate; style short; stigma terminal, expanded. Legume 1-many-seeded.

A genus of about 12 species occurring in North and South America, on the mountains of west tropical Africa, and Asia including China and Japan (Name commemorates Johann Gottlieb Gleditsch (1714-1786), Professor of Botany at the University of Berlin.)

1. Fruit broadly linear, over 7 cm long and usually at least twice as long; indehiscent, with many seeds embedded in pulp; ovary densely pubescent along both margins, sessile or nearly so; leaflets usually appressed-pubescent at least along the midvein 1. *G. triacanthos*.

1. Fruit oval, 5 cm or less in length, tardily dehiscent with 1-3 seeds lacking pulp; ovary glabrous or the sutures but sparingly ciliate, long-stalked; leaflets glabrous at maturity even along the midvein ... 2. *G. aquatica*.

1. *GLEDITSIA TRIACANTHOS* L., Sp. Pl.
1056. 1753.

Tree commonly up to 25 m high (reported up to 45 m) and 6-9(15) dm in diameter with somewhat pendulous branches forming a broad, often flat-topped crown and with deeply fissured bark. Thorns (modified branches) commonly 6-15(40) cm long, simple or 3-many branched (sometimes lacking or almost so). Leaves commonly about 20 cm long, with 18-28 leaflets or 2-pinnate with about 8-14 pinnae, the upper pinnae often about 10-14 cm long; petiole and rachises pubescent at maturity. Leaflets oblong-lanceolate, slightly to noticeably inequilateral, 1.5-3 cm long, usually obtuse, crenulate with short, pubescent petiolule about 1 mm long. Flowers greenish; the staminate numerous, in pubescent often fascicled racemes about 5-10 cm long; the pistillate in fewer-flowered, usually longer, solitary

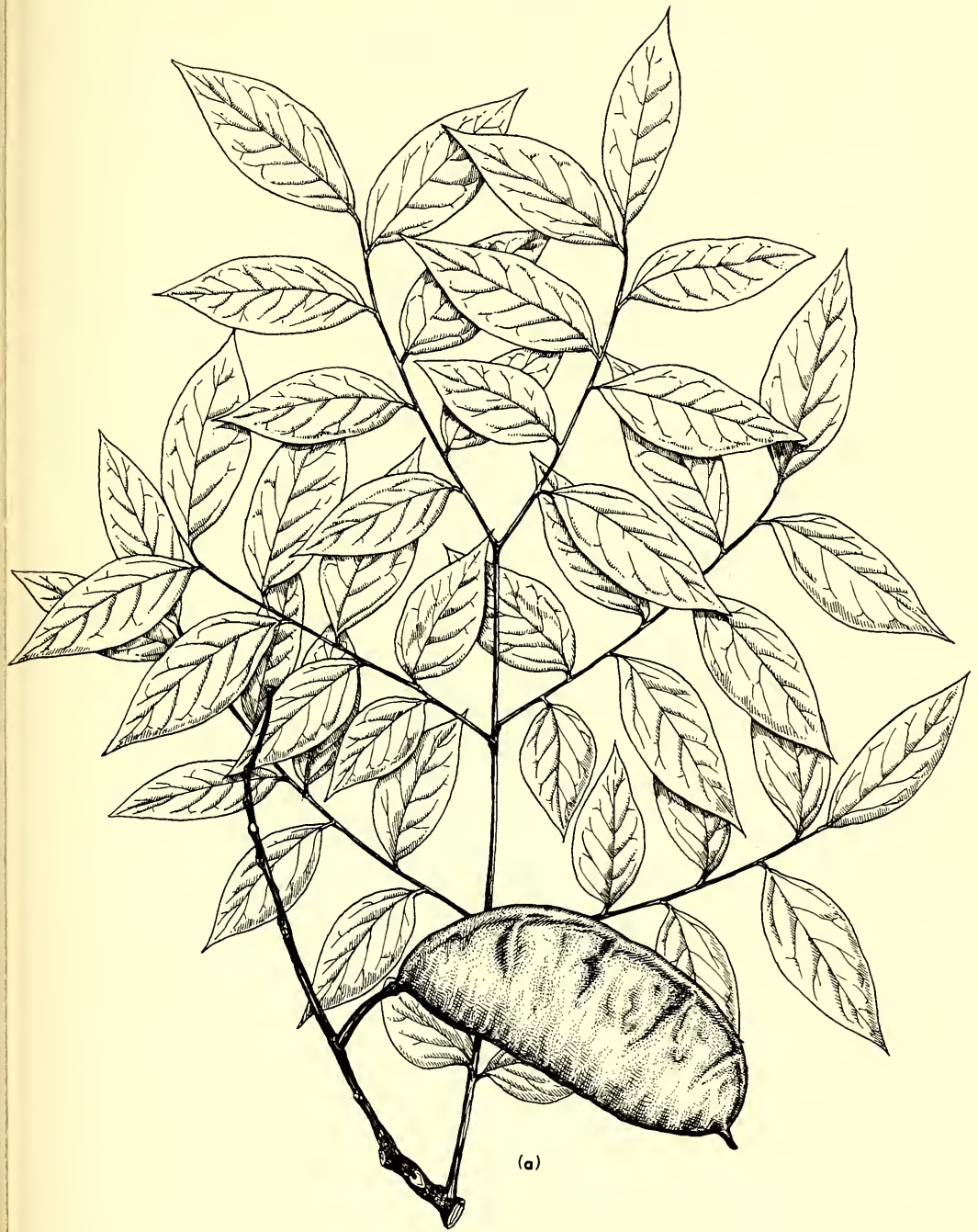


Fig. 10. *Gymnocladus dioica*. (a) Leaf and fruit.

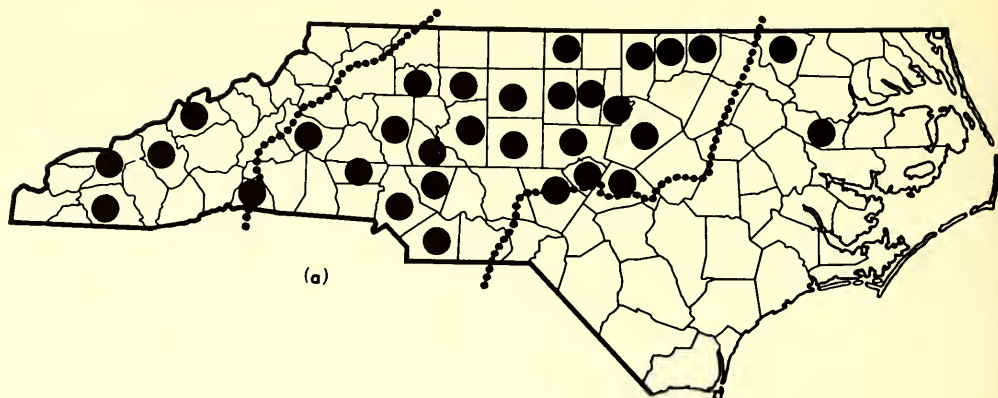


Fig. 11. *Gleditsia triacanthos*. (a) Distribution; (b) Branch showing dimorphic leaves, spines and fruit.



(a)

Fig. 12. *Gleditsia aquatica*. (a) Branch with leaves and fruit.

racemes. Hypanthium narrowly campanulate, about 1-2.5 mm long, 2-3 mm wide, gradually expanding upward, usually densely puberulent; calyx-lobes acute, 2-3 mm long, puberulent. Petals erect, about 4-5 mm long, longer than the sepals and about twice as wide. Stamens exserted; anthers greenish. Ovary densely pubescent along both sutures, sessile or nearly so, partly exserted. Legumes often curved and somewhat twisted, flattened, broadly linear, (0.7)2-3(4) dm long; 2-3.5 cm wide, reddish to dark-brown or black, many-seeded, indehiscent with thin walls and seeds embedded in a sugary pulp.

DISTRIBUTION: Western New York and Pennsylvania west to eastern South Dakota south to eastern Texas and Florida. The natural range of the HONEY LOCUST is difficult to determine as the plant has become widely naturalized throughout much of eastern North America. It is commonly established east of the mountains from New Jersey to Florida but there it is thought to have been naturalized. Its abundance and distribution in the three physiographic provinces of North Carolina is not at all demonstrated by specimens in our herbaria for in spite of its frequency, it is but rarely collected.

2. *GLEDITSIA AQUATICA* Marsh., Arbust. Am. 54. 1785.

Asacara aquatica (Marsh.) Raf., Sylva Tell. 121. 1838.

Tree up to 20 m high and 5-7 dm in diameter with undivided trunk usually less than 1 m high. Thorns simple or with 1-2 short branches, 7-14 cm long and up to 1-1.5 cm wide at base. The once-pinnately compound leaves with 12-18 leaflets; the bipinnately compound leaves with 6-8 pair of pinnae with the longest pinnae at the top. Petiole and rachis sparingly puberulent to glabrous. Leaflets ovate-oblong, obtuse or rarely emarginate, inequilateral, crenulate, glabrous, 2-3(5) cm long and about 8-12 mm wide. Inflorescences about 6-10 cm long with dark purple, somewhat puberulous peduncles. Hypanthium about 2-3 mm long, pubescent. Calyx-lobes narrow, acute, slightly pilose and as long as the broader, obtuse, erect, greenish petals. Ovary long-stipitate and glabrous or but sparsely ciliate along the sutures. Legumes oval, 2-5 cm long, about 2-3 cm wide, long-stalked, tapering to both ends, thin, 1-2(3)-seeded, papery, lacking pulp between the seeds, tardily dehiscent, dark brown.

DISTRIBUTION: Along the Coastal Plain reportedly from North Carolina south as far as central Florida and west into eastern Texas and north in the Mississippi Valley as far as Missouri, southern Illinois and Indiana. Rare in North Carolina and specimens of WATER LOCUST have been seen from there by me only from one locality. The immature specimen upon which this record was based can not now be located in the herbarium (UNC). It is questionable whether the species occurs within the state.

Subfamily III. PAPILIONOIDEAE

(= Lotoideae)

Trees, shrubs or herbs with simple or once pinnately or palmately compound, alternate, stipulate leaves commonly with stipels. Flowers typically perfect and zygomorphic. Hypanthium very small. Calyx gamosepalous, typically 5-parted, usually unequally lobed or divided. Petals typically 5, unequal, imbricate, papilionaceous (*i.e.* the uppermost or odd petal (the "standard") the largest and external in bud, the two lateral (the "wings") exterior to the two lowermost (the "keel") which are weakly coherent and usually enclose the stamens and pistil), borne on the upper rim of the very short hypanthium. Sta-

mens usually 10, their filaments separate or more typically with their filaments united into a sheath partially enveloping the pistil, most commonly diadelphous or monadelphous; anthers typically opening by a lateral slit. Ovary sessile or stipitate, typically 1-celled or occasionally partially or completely 2-celled through the intrusion of the sutures or transversely segmented and with 1 to many ovules. Endosperm absent.

Perhaps as many as 375 genera and 10,000 species best developed within the tropics but still well represented in the temperate regions.

Key to the Tribes of the Papilionoideae

(Based upon North Carolina representatives)

1. Stamens completely free (if in *Amorpha* appearing so, then petal but one); petals 5.
 2. Trees; leaves pinnately 5-11-foliolate Tribe I. SOPHOREAE. (p. 38)
 2. Herbs; leaves palmately 1- or 3-foliolate Tribe II. PODALYRIEAE. (p. 38)
1. Stamens monadelphous or diadelphous or if stamens are apparently nearly free then only one petal present.
 3. Leaflets at least slightly serrulate or denticulate; leaves 3-foliolate Tribe IV. TRIFOLIEAE. (p. 38)
 3. Leaflets entire (or if toothed, not 3-foliolate); leaves 1-many foliolate.
 4. Leaves even-pinnately compound, the rachis terminated by a tendril or bristle. Tribe IX. VICIEAE. (p. 39)
 4. Leaves 1-foliolate, palmately or odd-pinnately compound or, if even-pinnate, not terminated by a tendril or bristle.
 5. Filaments all or partly expanded just below the anthers; stipules reduced to minute blackish to reddish-brown gland-like callosities (the lower-most leaflets of some species may be mistaken for foliaceous stipules); leaflets typically 3 or 5 (in our species) or reduced to 1 Tribe V. LOTEAE. (p. 38)
 5. Filaments never conspicuously swollen or expanded just beneath the anthers; stipules not reduced to gland-like callosities; leaflets 1-many.
 6. Anthers alternately of 2 forms, 5 subglobose and versatile and 5 oblong or linear and basifix; filaments monadelphous; leaves palmately 1-many-foliolate. Tribe III. GENISTEAE. (p. 38)
 6. Anthers uniform (or if of 2 forms, the fruit or leaves punctate-glandular or fruit subterranean or 1-seeded or breaking up into 1-seeded segments); filaments diadelphous or sometimes monadelphous; leaves pinnately or palmately 1-many-foliolate.
 7. Fruits indehiscent and 1-seeded, or 2-several-seeded and transversely septate into 1-seeded, indehiscent joints; foliage never glandular-punctate Tribe VII. HEDYSAREAE. (p. 38)
 7. Fruits dehiscent (or, if 1-seeded and indehiscent, with punctate-glandular foliage) and usually 2-many-seeded.
 8. Foliage and/or calyces punctate-glandular Tribe VI. PSORALEAE. (p. 38)
 8. Foliage and/or calyces lacking punctate glands.
 9. Herbs, shrubs, trees or woody vines with pinnately compound 5-to-many-foliolate leaves Tribe VIII. GALAGEAE. (p. 39)

9. Erect herbs or vines with 1-3-foliolate leaves or, if 5-7 pinnately compound, then twining, herbaceous, climbing vines with purplish petals
 Tribe X. PHASEOLEAE. (p. 40)

TRIBE I. SOPHOREAE

- One genus native to North Carolina 7. CLADRASTIS. (p. 41)

TRIBE II. PODALYRIEAE

1. Ovary conspicuously stalked; legume inflated and conspicuously stipitate (the stipe equaling or exceeding the calyx-tube); petals white, cream, yellow or blue
 8. BAPTISIA. (p. 41)
 1. Ovary sessile or very nearly so; legume compressed or flattened, sessile or very short-stalked (the stipe never as long as the calyx tube); petals yellow
 9. THERMOPSIS. (p. 52)

TRIBE III. GENISTEAE

1. Herbs with simple or palmately 3-5-11-foliolate leaves.
 2. Petals yellow; legume inflated; leaves simple or palmately 3-foliolate
 10. CROTALARIA. (p. 58)
 2. Petals blue or white; legume flattened; leaves simple or palmately 5-11-foliolate
 11. LUPINUS. (p. 69)
 1. Shrub with palmately 3-foliolate (or the uppermost simple) leaves
 12. CYTISUS. (p. 73)

TRIBE IV. TRIFOLIEAE

1. Petals withering and persistent, adhering to the staminal tube
 13. TRIFOLIUM. (p. 75)
 1. Petals deciduous soon after anthesis, free from the staminal tube.
 2. Legume straight or nearly so; flowers in elongate, slender, often 1-sided racemes
 14. MELILOTUS. (p. 93)
 2. Legume strongly curved or spirally coiled; flowers in short, spike-like racemes ..
 15. MEDICAGO. (p. 98)

TRIBE V. LOTEAE

- Only one genus in North Carolina 16. LOTUS. (p. 103)

TRIBE VI. PSORALEAE

1. Shrubs; leaves pinnately compound; corolla consisting of the standard only
 17. AMORPHA. (p. 107)
 1. Herbs; leaves pinnately or palmately compound; corolla consisting of standard, wing and keel petals (or of standard and 4 petaloid staminodes).
 2. Flowers in racemes or spikes; corolla papilionaceous; stamens 9 or 10; leaves pinnately 3-foliolate or palmately 3-7-foliolate (or the upper occasionally simple)
 18. PSORALEA. (p. 114)
 2. Flowers in densely clustered, involucrate, head-like spikes; corolla scarcely papilionaceous, the standard attached to the base of the calyx, the 4 other petals (perhaps better considered petaloid staminodia) borne at the top of the staminal column; stamens 5; leaves pinnately 3-7-(11)-foliolate
 19. PETALOSTEMUM. (p. 120)

TRIBE VII. HEDYSAREAE

1. Leaflets 11 or more in number.
 2. Inflorescence racemose with about 1-6 flowers; stamens diadelphous, 5 and 5
 20. AESCHYNOMENE. (p. 123)
 2. Inflorescence umbellate with about 10-15 flowers; stamens diadelphous, 9 and 1
 21. CORONILLA. (p. 127)
 1. Leaflets 5 or fewer in number.
 3. Leaves palmately 4-foliolate 22. ZORNIA. (p. 127)

3. Leaves pinnately (1)3-4-foliolate.
4. Leaves pinnately 4-foliolate 23. ARACHIS. (p. 129)
4. Leaves pinnately 3-foliolate.
5. Petals yellow; hypanthium greatly elongate and resembling a pedicel; stipules fused to petioles for at least 1/3 their length and partly ensheathing the stem 24. STYLOSANTHES. (p. 131)
5. Petals white, blue, violet; purple or yellow; hypanthium lacking; stipules attached to stem and not attached to petiole for 1/3 their length and never ensheathing the stem.
6. Leaflets often stipellate (stipels absent in 3 of our species); legume of (1)-2-several segments covered with minute hooked hairs; calyx lacking bractlets at base 25. DESMODIUM. (p. 134)
6. Leaflets always estipellate; legume of 1 segment (or rarely with an empty, sterile, stalk-like, basal segment); surface of loment glabrous or densely pubescent but lacking uncinata (hooked or barbed hairs); calyx subtended by a pair of closely associated, appressed bractlets 26. LESPEDEZA. (p. 171)

TRIBE VIII. GALAGEAE

1. Leaves even-pinnately compound (i.e. terminal leaflet lacking).
2. Legume compressed or flattened, wingless; our species annual herbs with basically yellowish petals.
3. Legume linear, 20-times or more as long as wide; seeds 20 or more; calyx-lobes all 1 mm long or more; standard 1 cm long or more .. 27. SESBANIA. (p. 195)
3. Legume oblong to elliptical, less than 5-times as long as wide; seeds (1)2; calyx-lobes all less than 1 mm long and the shortest usually about 0.2 mm long; standard 1 cm long or less 28. GLOTTIDIUM. (p. 198)
2. Legume 4-angled or 4-winged; our species a shrub with purplish-rose to red petals 29. DAUBENTONIA. (p. 200)
1. Leaves odd-pinnately compound (i.e. terminal leaflet present).
4. Shrubs, trees or woody vines.
5. Racemes terminating short branches, twining woody climbers, at least near branch tips, spines and thorns lacking; stamens diadelphous; intrastaminal disk present 30. WISTERIA. (p. 202)
5. Racemes axillary, erect shrubs or trees lacking twining branch tips; stipular spines often present; stamens monadelphous; intrastaminal disk lacking 31. ROBINIA. (p. 207)
4. Herbs.
6. Keel-petals laterally pouched; legume terete or subquadrate, 1-celled and with neither suture protruding into the locule; trichomes 2-branched but appearing simple, closely-appressed and attached at the middle 32. INDIGOFERA. (p. 215)
6. Keel-petals lacking a lateral spur-like pouch; legume flat or if terete either 2-celled or with one suture protruding into the locule; trichomes villous to very short, usually simple but in one species with malpighiaceous hairs (i.e. two-branched and closely appressed but appearing simple and attached at the middle).
7. Principal racemes terminal or if lateral then apparently opposite the leaf; legume flattened, 1-celled and without intruding sutures; standard orbicular to broadly obovate 33. TEPHROSIA. (p. 216)
7. Principal racemes axillary; legume turgid, 2-celled or if only 1-celled then with an intruding suture; standard oblong-obovate 34. ASTRAGALUS. (p. 222)

TRIBE IX. VICIEAE

1. Style more or less terete in cross-section with a tuft of hairs at the summit; staminal tube oblique at apex 35. VICIA. (p. 228)
1. Style strongly flattened and hairy down its inner surface; staminal tube truncate at apex.

2. Wings adherent to the keel; calyx-lobes leafy; stipules larger than lowermost leaflet 36. PISUM. (p. 234)
2. Wings free from the keel or nearly so; calyx-lobes not leafy; stipules much smaller than lowermost leaflet 37. LATHYRUS. (p. 236)

TRIBE X. PHASAEOLAE

1. Leaves 5-7-foliolate 38. APIOS. (p. 243)
1. Leaves 1-3-foliolate.
2. Standard about twice as long as the wings and keel and bluish or scarlet.
3. Corolla scarlet; legume constricted between the scarlet seeds; plants an erect herb bearing spines 39. ERYTHRINA. (p. 245)
3. Corolla violet or bluish; legume not constricted between the brownish or blackish seeds; plants twining or trailing vines lacking spines.
4. Calyx-tube shorter than the lobes, smaller than and obscured by the subtending bractlets; legume sessile, 6 cm long or more; style bearded only near the stigma; standard spurred 40. CENTROSEMA. (p. 247)
4. Calyx-tube much longer than the lobes, larger and not at all hidden by the small subtending bractlets; legume with elongate stipe and less than 6 cm long; style bearded along the upper side; standard not spurred 41. CLITORIA. (p. 249)
2. Standard little longer than the wing- or keel-petals, at least not twice as long and of various colors including bluish-violet and reddish.
5. Petals yellow or orange; legume with 3 or fewer seeds 42. RHYNCHOSIA. (p. 251)
5. Petals blue, purple, white, red or pink or if yellow with legumes more than 3-seeded.
6. Style bearded along the upper surface.
7. Flowers numerous in racemes or panicles; keel spirally coiled 43. PHASAEOLUS. (p. 257)
7. Flowers 1-few in pedunculate heads, umbels or very much shortened racemes; keel slightly to strongly incurved.
8. Wing-petals auricled at base; seeds glabrous 44. VIGNA. (p. 261)
8. Wing-petals lacking basal auricles; seeds wooly-pubescent 45. STROPHOSTYLES. (p. 265)
6. Style beardless.
9. Ovaries and legumes densely long-villous.
10. Erect annuals with usually vine-like branchlets 46. GLYCINE. (p. 267)
10. Trailing or high climbing perennials.
11. Leaflets often lobed and mostly 6 cm long or more; corolla 2 cm long or more and mostly a bluish-violet. 47. PUERARIA. (p. 269)
11. Leaflets neither lobed nor exceeding 6 cm in length; corolla 1-2 cm long or less and reddish to rose-purple. 49. GALACTIA. (p. 272)
9. Ovaries and legumes glabrous or merely sparsely to densely short-pubescent.
12. Calyx lacking bractlets at base; petals pale lilac to white; blades of wing- and keel-petals shorter than their claws; aerial legumes stipitate; calyx tubular, more than twice as long as the lobes 48. AMPHICARPA. (p. 269)
12. Calyx with a pair of bractlets at base; petals purple, red or pink; blades of wing- and keel-petals longer than their claws; legumes sessile; calyx campanulate to turbinate, not more than twice as long as the lobes 49. GALACTIA. (p. 272)

7. CLADRASTIS Raf., Cincinnati Lit. Gaz.
1:60. 1824.

Medium-sized trees with smooth, gray bark. Stipules lacking. Leaves deciduous, alternate, odd-pinnately compound. Buds 4 together and all enclosed within the hollow base of the petiole. Leaflets usually alternate, 7-15, entire, petiolulate, usually glabrous at maturity. Inflorescence a large, terminal, pendent, paniculate raceme. Calyx campanulate with 5, nearly equal, short, broadly triangular lobes of which the upper 2 are almost completely united. Corolla papilionaceous; the petals clawed, white or pinkish, those of the keel distinct, the standard obovate to almost orbicular. Stamens 10, their filaments distinct. Ovary linear, short-stalked. Legume thin, compressed, linear, tapering to either end, stalked, the walls thin and membranous, tardily dehiscing, 4-6-seeded.

A genus of about 4 species, all but one of which are to be found in China and Japan. (Name derived from the Greek *clados* = branch and *thraustos* = brittle, in reference to the easily broken branches.)

1. CLADRASTIS LUTEA (Michx. f.) K.
Koch, Dendrol. 1:6. 1869.

Tree up to 15-20 m high with trunk 3-6 (12) dm in diameter separating about 1-2 m from the base into several stems forming a full crown with somewhat pendulous branches. Freshly cut wood bright yellow. Leaves about 4-6 dm long, appearing early in the spring and turning bright yellow in the late autumn. Leaflets (5) 7-9 (11), alternate, the laterals broadly oval to ovate, the terminal often obovate, about 6-10 (18) cm long and (2.5) 4-8 (12) cm wide, acute or abruptly short-acuminate. Inflorescence an elongate, nodding panicle about 1-3 (5) dm long and 10-15 cm in diameter. Flowers fragrant. Calyx-tube campanulate, about 5-7 mm long, moderately to densely puberulent; the lobes nearly equal, obtuse, 1.5-2 mm long, usually densely puberulent. Petals white, clawed; the standard orbicular or nearly so, about 1.6-1.9 cm long, reflexed above the middle and with pale yellow patch on the inner surface; keel and wings nearly alike, distinct, about as long as the standard. Filaments glabrous, curving beneath the anthers. Ovary linear, bright red, pubescent; style glabrous, slender. Legume glabrous, about 6-10 cm long and 8-12 mm wide with a slender stalk of about 5-8 mm long. Seeds oblong, compressed.

DISTRIBUTION: The YELLOWWOOD is rare and local, ranging from southern Indiana and Illinois south through Ken-

tucky, Tennessee, the mountains of extreme western North Carolina and northern Georgia and west into northern Alabama, Arkansas and Missouri.

8. BAPTISIA Vent., Dec. Gen. Nov. 9. 1808.

Rhizomatose perennials, commonly darkening or blackening in drying with alternate, usually palmately 3-foliolate (rarely 1- or 2-foliolate in species out of our range). Stipules present in all our species although often caducous. Flowers borne in terminal or axillary racemes (in all of ours) or occasionally borne singly. Calyx persistent, campanulate, slightly 2-lipped, 4- or 5-toothed or lobed; the upper lip entire, notched or 2-lobed, the lower deeply 3-lobed. Corolla papilionaceous; the petals 5, white, cream, yellow or blue; the standard orbicular, usually reflexed and less than the wing- and keel-petals in length. Stamens 10, their filaments distinct. Ovary stipitate. Legume papery or woody in texture, usually inflated, stalked, globose to cylindrical, beaked, many-seeded.

A genus of perhaps 30 species of the eastern United States. (Name derived from the Greek *baptizein* = to dye, in reference to the use of certain species in former times as a substitute for indigo.)

The species of WILD or FALSE INDIGO are very perplexing in the Southeast; they obviously require further study and seemingly are complicated by considerable hybridization. Several species recognized by Larisey in her monograph as occurring in North Carolina are here considered as being insufficiently distinct from more widespread species. Two species previously not reported north of South Carolina are included on the basis of more recent collections.

1. Petals blue 1. *B. australis*.

1. Petals white, cream or yellow.

2. Plants with flowers 2 cm or more in length; ovary densely pubescent and petals yellow or cream.

3. Floral bracts linear-subulate, the broadest less than 3 mm wide, caducous or deciduous soon after the petals; pedicels mostly less than 1 cm long; pubescence usually closely appressed 2. *B. cinerea*.

3. Floral bracts ovate to lanceolate and all 5 mm or more in width, persistent; pedicels typically 1-2.5 cm long; pubescence usually wide-spreading.. 3. *B. bracteata*.



Fig. 13. *Cladrastis lutea*. (a) Distribution; (b) Branch with leaves and fruit; (c) Flower cluster.

2. Plants lacking the above combination of characters; the flowers 1-2(2.2) cm long, the ovary glabrous or but sparsely pubescent and the petals white, cream or yellow.

4. Petals yellow.

5. Racemes numerous; fruit black after drying and less than 1.5 cm long; plant usually blackening in drying..... 4. *B. tinctoria*.

5. Racemes few to several; fruit brownish and over 1.5 cm long; plant darkening but not blackening in drying 5. *B. Serenae*.

4. Petals white.

6. Fruit cylindrical, brown, not glaucous, ascendent, 10 mm thick or less; calyx drying greenish to straw-colored, neither dark purplish nor conspicuously glaucous 6. *B. alba*.

6. Fruit oblongoid, black, glaucous, pendent, 1.5 cm thick or more; calyx often drying dark purplish-black and glaucous at least on the lobes and often on the tube 7. *B. pendula*.

1. BAPTISTIA AUSTRALIS (L.) R. Br. in Ait., Hort. Kew. ed. 2.3:6. 1811.

B. minor Lehm. var. *aberrans* Larisey, Ann. Mo. Bot. Gard. 27: 206. 1940.

Plants 5-10(15) dm high, glabrous throughout, more or less glaucous with branches ascendent to wide-spreading. Stipules lanceolate to narrowly ovate, or those of the upper leaves subulate, acute to acuminate, 3-15 cm long, as long or longer than the petioles, usually persisting. Petioles slender, 1-4 mm long on the upper leaves and about 4-10(20) mm long on the lowermost leaves. Leaflets usually obovate to oblanceolate, cuneate, obtuse to acute, commonly apiculate, rarely retuse, 2-6(8) cm long, 0.8-2(3) cm wide, subsessile or shortly petiolate. Racemes terminal, erect, usually loosely flowered, typically solitary or more rarely appearing subverticillate, 1-3(4) dm long with flowers about 2-3 cm long. Pedicels 4-12 mm long. Bracts ovate-lanceolate, 7-12 mm long; caducous. Calyx glabrous except for the densely short-ciliate margin; the tube 6-10 mm long; the upper lobes fused and barely emarginate; the lower deltoid, acute, 2-3 mm long. Petals violet to deep blue, wing and keel petals about 2.5-3 cm long; the emarginate, reflexed, standard about 2-4 mm less. Ovary glabrous. Legume thin-walled, inflated, 3-6 cm long and (1)1.5-2(2.5) cm wide, tapering into beak and with stipe 1-2-times as long as the calyx-tube.

DISTRIBUTION: Pennsylvania and southern Indiana south to northern Georgia.

As shown by the synonymy above, plants which were considered by the monographer of the genus to belong to two different species are here tentatively treated as one. Larisey's map of the distribution of these supposedly distinct species shows them both occupying approximately the western two-thirds of North Carolina. The range of the typical element of *B. minor* (= *B. australis* var. *minor* (Lehm.) Fernald) is shown by her to be west of the Mississippi River and centered about the Ozarks. It is geographically separated from var. *aberrans* according to Larisey's map by almost all of Tennessee. Her key-characters separating these two varieties were based solely upon geography. The small amount of material from North Carolina now available is not sufficient to settle the problem conclusively. Most of the collections seen are labeled *B. australis* but on the basis of leaf-size, petiole-length and fruit-dimensions would seem to belong to *B. minor*. Although the blue-flowered plants occurring in North Carolina are tentatively here referred to but one species, obviously this problem needs additional field work and the study of a great many more collections from throughout the range of *B. australis* and *B. minor*.

2. BAPTISIA CINEREA (Raf.) Fern. & Schub., Rhodora 50:201. 1948.

B. villosa in the sense of most authors but not of Walter's basionym.

Plants erect, 3-6(9) dm high with stout (about 6-8 mm in diameter), heavily ribbed stem and a few wide spreading branches; blackening or at least darkening after being dried, and inconspicuously short, tawny appressed-pubescent almost throughout. Stipules of the lower leaves lanceolate to linear, 1-2(4) cm long and 5-12 mm wide, often persistent or tardily deciduous, acute; those of the upper leaves much smaller, subulate to linear, 2-5 mm long and usually soon deciduous. Petioles very stout, short, usually 2-6 mm long but on the larger lower leaves sometimes up to 1.2 cm. Leaflets coriaceous or nearly so, conspicuously reticulate, mostly elliptic, oblanceolate or obovate, (3)4-7(9) cm long, usually obtuse, less commonly acute, typically apiculate. Racemes terminal, usually solitary, typically erect, 1-3(4) dm long with numerous flowers 2-2.8 cm long. Pedicels about 4-8(10) mm long (becoming more elongate in fruit) and about 1 mm in diameter, ascendent. Bracts linear-subulate, 7-10 mm long; caducous or dropping soon after petals. Calyx appressed-pubescent



Fig. 14. *Baptisia australis*. (a) Distribution; (b) Leafy and flowering branches; (c) Fruit.

throughout; the tube 5-8 mm long; the upper two lobes fused with a truncate apex or scarcely emarginate; the three lower lobes deltoid, acute, about 3-4 mm long. Petals usually bright yellow (occasionally pale yellow), the wing and keel petals 2-2.5 cm long, the standard about 5 mm shorter. Ovary densely and finely short-pubescent and the trichomes usually tawny. Legume thick-walled, greatly inflated, sparsely pubescent, the body oblong to ovoid-ellipsoidal, 2.5-3 cm long, up to 1.7 cm thick, with stipe slightly exceeding or up to twice as long as the calyx-tube and apically tapering into beak 1-2 cm long.

DISTRIBUTION: In sandy soil along the Coastal Plain from southeastern Virginia into South Carolina.

3. *BAPTISIA BRACTEATA* Muhl. ex Ell.,
Bot. S.C. & Ga. 1:469. 1817.

Podalyria bracteata Muhl., Cat. 42. 1813.
nom. nud.

Plants erect, 3-6 dm high with stout (about 4-8 mm in diameter), ribbed stem and with wide-spreading branches, darkening but not blackening in drying, more or less covered with soft, spreading, grayish pubescence. Stipules of the lower leaves conspicuous, lanceolate, acute, about 2-4 cm long and 8-14 mm wide, persistent; those of the upper leaves much smaller, usually ovate, obtuse and about 2 mm long. Petioles 3-12 mm long. Leaflets membranous, oblanceolate to obovate or elliptic-obovate, cuneate, obtuse to emarginate, more rarely acute, about 5-10 cm long and 2-3.5 cm wide with the veins of the lower surface forming a fine reticulate pattern at maturity although not elevated. Racemes terminal but often deflexed to one side and appearing axillary after the development of the axillary branch into a well-developed shoot; the inflorescence 1-2 dm long, often pronouncedly secund with numerous, approximate flowers 2-2.8 cm long. Pedicels about (1) 1.2-1.8 (2.5) cm long, curving upward. Bracts lanceolate, ovate-lanceolate or even ovate, 1-2.5 cm long and about 7-10 mm wide, persistent. Calyx with short, spreading pubescence or more or less glabrous except for the densely short-ciliate margin; the tube about 5-7 mm long; the two upper lobes almost completely fused but usually somewhat emarginate; the three lower lobes oblong to deltoid, obtuse to acute, 3-5 mm long. Petals pale yellow or cream-colored; the standard about 1.8-2 cm long, the wing and keel petals about 5 mm longer. Ovary densely pubescent (the trichomes usually white or pale yellow). Legume thick-walled, more or less appressed-pubescent, the body elliptic, 3-4 cm long, 1.5-1.7 cm thick, with

stipe about equaling the calyx and apically tapering into a slender beak.

DISTRIBUTION: North and South Carolina, Georgia and Alabama.

This species was reported as occurring in North Carolina both by Larisey, the most recent monographer of the genus, and by Small. Larisey (1940, p. 155) cited two specimens from this state, *Bartram & Long* April 14-17, 1911 (PH) "not far outside the town, Wilmington" and a specimen of Curtis (NY), without definite locality. The specimen of Bartram & Long proves itself to be *B. cinerea* by its narrow bracts, short pedicels and closely appressed pubescent. Curtis' specimen is perhaps *B. bracteata* although Miss Larisey appended a note to the effect that the specimen "resembles *leucophaea* more closely than usual." The distinction between these two species made in Larisey's monograph is certainly not clear. The *bracteata-leucophaea* complex obviously requires further study.

The specimens of *B. bracteata* examined are interestingly diverse. Those seen from the southern and western portion of its range possess calyx-tubes which are densely and uniformly short-pubescent while many of those from South Carolina and the one from North Carolina have calyx-tubes glabrous or nearly so. It may be well to note in passing that the range indicated by the map in Larisey's monograph is not supported by the specimens cited. The map shows the species extending into Florida and the extreme southeastern corner of Alabama while the localities cited indicate that it wasn't known from Florida and in Alabama was to be found only in the mountainous northeastern portion.

The only specimen of this species known definitely from North Carolina (Curtis' specimen is without locality, lacks the original label and in some respects seems closer to the western *B. leucophaea*) is *Ahles 17800* collected in the mountains in a "recently cleared area (upland), 4.3 miles north of McDowell-Rutherford County line."

4. *BAPTISIA TINCTORIA* (L.) R. Br. in
Ait., Hort. Kew. ed. 2. 3:6. 1811.

B. Gibbesii Small, Fl. SE. U. S. 599, 1331.
1903.

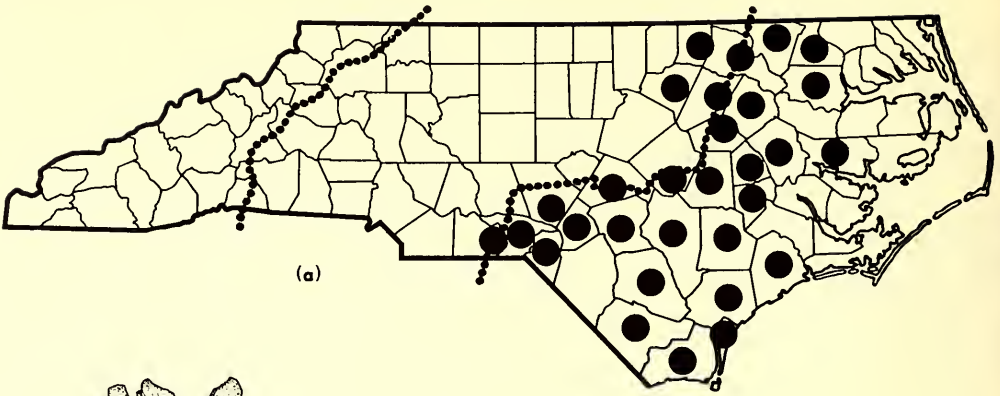


Fig. 15. *Baptisia cinerea*. (a) Distribution; (b) Leafy and flowering branch; (c) Fruit.

B. tinctoria var. *Gibbesii* (Small) Fern., *Rhodora* 38: 424. 1936.

B. tinctoria var. *crebra* Fern., *Rhodora* 39:415. 1937.

B. tinctoria var. *projecta* Fern., *Rhodora* 39:415. 1937.

Plants bushy, up to 1 m or so high with numerous, wide-spreading, slender branches arising from the single primary stem. Glabrous (rarely in part slightly pubescent), glaucous at least when young and usually blackened in drying. Petioles slender, 1-5(10) mm long. Stipules minute and soon deciduous. Leaflets obovate, cuneate, usually retuse, about 0.6-2(4) cm long and 0.5-1.2(1.8) cm wide with somewhat revolute margins (at least when dried) and with a finely veined lower surface. Racemes numerous, terminating most of the branches, 2-10(15) cm (in our material), loosely flowered. Pedicels about 4-6 mm long subtended by lanceolate-setaceous, minute, deciduous bracts. Flowers 9-14(16) mm long. Calyx glabrous except for minutely ciliate margins; the tube about 2-3 mm long; lobes of the lower lip acute, about 1-1.5 mm long, those of the upper lip about 0.5 mm long. Petals yellow, about 1-1.2(1.5) cm long, the keel- and wing-petals usually 2-3 mm longer than the standard. Ovary glabrous. Legumes ovoid to elliptic, rounded or tapering at the ends, 0.6-1.2(1.5) cm long and about 6-8 mm thick on stalk about 5-7 mm long.

DISTRIBUTION: Southern Maine, to southern Michigan and Indiana (disjunct in southeastern Minnesota) south to Florida and locally to Louisiana.

In recent years several varieties have been recognized within the species. Both of the variants as well as the typical element have been attributed to North Carolina by recent authors. The proposed varieties do not appear to represent geographical or ecological variants but are apparently mere extremes.

B. tinctoria var. *crebra* was proposed by Fernald and confirmed by Larisey (1940) as characterized by the possession of primary leaflets 1.5-4 cm long and 8-17 mm wide with flowers 1.3-1.6 cm long and fruit-bodies 0.8-1.5 cm long with attenuate base and tip. This was contrasted with the following characteristics of the typical element: leaflets 0.6-1.8 cm long and 0.5-1 cm broad, flowers 1-1.3 cm long and fruit-bodies 0.5-1 cm long. After sorting North Carolina representatives of this species by

these criteria, one finds that there is no geographical segregation of the proposed taxa. Both types are found commonly in each of the state's three physiographic provinces. Clausen (*Rhodora* 46: 281. 1944) has also indicated that these tendencies seemed impossible to maintain as separate taxa.

B. tinctoria var. *projecta* Fern. was originally differentiated from both the typical element and var. *crebra* whose racemes are 0.3-1(1.5) dm long by its racemes of from 3-4.5 dm long. It was known to Fernald and Larisey (1940) only from the mountains of Pennsylvania and Virginia. Clausen (*Rhodora* 46: 281. 1944) thought that the lower limits of the raceme length of var. *projecta* should be reduced to 1.5 dm thus including additional specimens from Pennsylvania and New Jersey. Fernald (1950) later gave 2-4.5 dm as the length of racemes of this variety. Gleason (1952, p. 393) characterized var. *projecta* as possessing racemes 1-2 dm or more in length and extended the range into the mountains of North Carolina. The typical element was said by Gleason to have racemes 2-6 cm long but rarely longer. Several specimens from North Carolina have been examined with racemes 10-14 cm long thus fulfilling Gleason's characterization of the variety. However, it is felt that recognition of var. *projecta* would be nothing more than a mechanical separation resulting in varieties of little or no biological significance. At present the species had best be treated as being somewhat variable but unencumbered with such mechanically sorted varieties.

5. BAPTISIA SERENAE M. A. Curtis, *Am. Jour. Sci.* II. 7:406. 1849.

Plant up to 1 m high, glabrous or occasionally sparsely pubescent, darkening but typically not blackening in drying and with numerous, wide-spreading branches. Stipules deciduous, minute, setaceous. Petioles slender, 3-8 mm long. Leaflets usually oblanceolate, cuneate, acute to rounded, mucronate, 1.5-4 cm long, 0.5-1 cm wide, usually glabrous or occasionally finely pubescent especially along the midvein and with revolute margins. Racemes terminal or lateral but the terminal longer, mostly 1-3 dm long with ascending, subverticillate flowers about 1.5 cm long. Pedicels

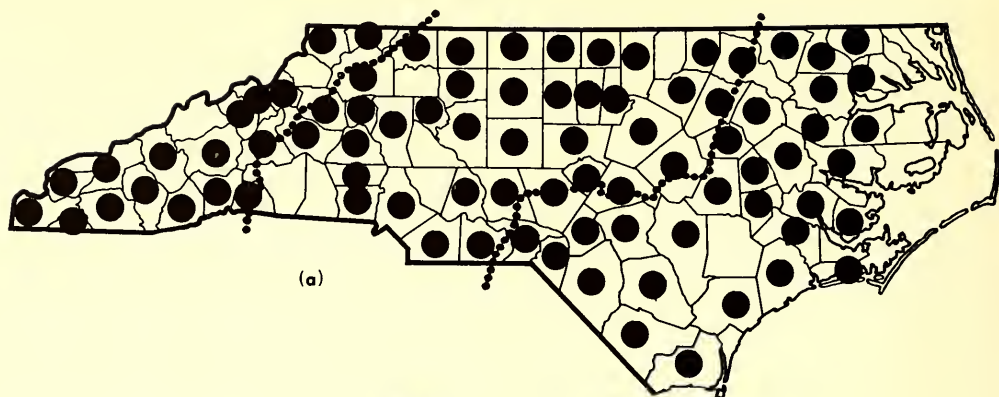


Fig. 16. *Baptisia tinctoria*. (a) Distribution; (b) Flowering branches; (c) Fruit.

slender, 3-5 mm long with the subtending, caducous bracts lanceolate and less than 3 mm long. Calyx glabrous except for the short-pubescent margins; the tube 3-5 mm high; the upper lobes fused, ovate, entire or barely emarginate; the lower lobes deltoid, 1-1.5 mm long. Petals bright yellow; the standard 1-1.2 cm long and about as broad; wing- and keel-petals as long or up to 2 mm longer. Legume more or less oblong, subcylindrical, inflated, 1.5-3.5 cm long, 6-8 mm wide, thin-walled, rusty-brown to purplish-brown, short stalked and short- and slender-beaked.

DISTRIBUTION: Although known to Larisey only from Florida, Georgia and South Carolina, it also occurs on the Coastal Plain of southeastern North Carolina. This is not a surprising extension since the type-locality (Society Hill, Darlington Co., South Carolina) is less than fifty miles from Hoke County, in which its only known North Carolina locality occurs.

6. *BAPTISIA ALBA* (L.) R. Br. in Ait., Hort. Kew. ed. 2. 3:6. 1811.

B. albescens Small, Fl. SE. U. S. 600, 1331. 1903.

Plants 0.5-1.2(2) m high with a slender, ribbed stem commonly brown or dark purplish with slender, wide-spreading branches. Glabrous or nearly so throughout or but sparingly short-pubescent, conspicuously glaucous and often not blackening in drying. Stipules minute or up to 5 mm long, deltoid or lanceolate, usually soon deciduous. Petioles slender, glabrous to sparingly short-pubescent, (0.4)0.5-1.5(1.8) cm long. Leaflets elliptic, oblanceolate, oblong-oblanceolate or obovate, cuneate, obtuse to acute, commonly retuse or apiculate, 2-4(6) cm long and about 8-15 mm wide, glabrous above and glabrous to sparsely pubescent beneath especially along the veins. Racemes 1.5-4(5) dm long, slender, terminal, its peduncle long and naked, with oblanceolate, caducous bracts about 5-7 mm long and with usually numerous, subverticillate flowers 1.2-1.8 cm long. Pedicels (2)4-10(12) mm long and glabrous to sparsely pubescent. Calyx usually drying greenish-yellow to straw-colored, not strikingly glaucous, glabrous except for the densely, short-ciliate margins; tube 4-6 mm long; the two upper lobes fused, its upper margin entire or slightly emarginate; lobes on the lower side of the tube deltoid, 1.5-2.5 mm long. Petals white; the standard usually reflexed, 1-1.5 cm long, the wings and keel usually 2-3 mm longer. Ovary glabrous. Legume cylindrical, inflated, about 2-3.5 cm long and 5-10 mm thick, usually light-brown, erect,

with a stipe equaling or almost twice as long as the calyx tube.

DISTRIBUTION: Eastern Shore of Virginia south to Florida and in the mountains of North Carolina and Tennessee.

Larisey, the monographer of the genus, and Small (1933, p. 675, 677) considered what is here treated as *B. alba* as two species. The principal difference between the two supposed species is that the so-called *B. albescens* has larger leaflets with slightly pubescent lower surfaces and sometimes also pubescent pedicles and rachis in contrast to the glabrous condition of *B. alba*. With the little material available it does not appear to me that the two previously accepted entities are specifically distinct. Additional study is obviously in order.

7. *BAPTISIA PENDULA* Larisey, Ann. Mo. Bot. Gard. 27: 170. 1940.

B. pendula var. *macrophylla* Larisey, Ann. Mo. Bot. Gard. 27: 172. 1940.

B. pendula var. *obovata* Larisey, Ann. Mo. Bot. Gard. 27: 171. 1940.

Plants 1.5 m or more high, glabrous, glaucous throughout with wide-spreading strongly geniculate branches. Stipules subulate to setaceous, usually less than 3 mm long and typically caducous. Petiole usually 8-13 mm long. Leaflets elliptic, obovate or oblanceolate, 3-7 cm long, 1-2(4) cm long, acute to obtuse. Racemes erect, often much exceeding the foliage, 1.5-6 dm long with numerous closely clustered, subverticillate flowers about 2 cm long. Bracts linear-subulate, about 5 mm long, caducous. Pedicels 4-7 mm long, elongating in fruit. Calyx often drying dark blackish-purple, strikingly glaucous; the tube 6-8 mm long; the upper lobes fused and either rounded or emarginate; the lower three deltoid to ovate, obtuse to acute, 2-3 mm long. Petals white, the standard about 1.5 cm long and the wing and keel petals 2-5 mm longer. Ovary glabrous. Legume pendulous, oblongoid, blackish, glaucous, 3.5-4.5 cm long, 1.5-2.5 cm thick with an abrupt, but slender peak about 5 mm long with a stipe equaling to twice exceeding the calyx-tube.

DISTRIBUTION: Southcentral North Carolina south into northern Florida.

This species was not known to Larisey from further north than central South Carolina but several recent North Carolina collections are certainly this species. The

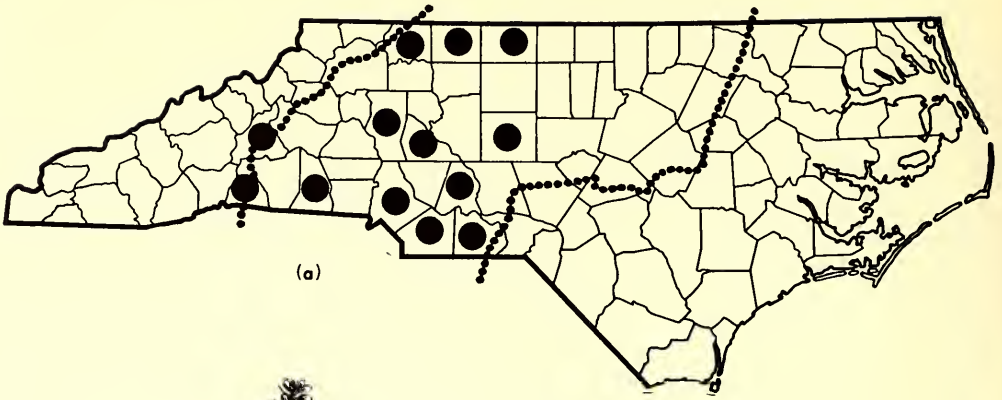


Fig. 17. *Baptisia alba*. (a) Distribution; (b) Leafy and flowering branches; (c) Fruit.



Fig. 18. *Baptisia pendula*. (a) Distribution; (b) Leafy and flowering branch; (c) Fruit.

varieties *obovata* and *pendula* described at the same time by Miss Larisey do not seem to warrant formal recognition.

9. THERMOPSIS R. Br. in Ait., Hort. Kew. ed. 2. 3:3. 1811.

Rhizomatose perennial herbs usually less than 1.5 m high, sometimes darkening but not blackening in drying with alternate, palmately 3-foliolate leaves and somewhat persistent, occasionally foliaceous stipules. Racemes terminal with few to many flowers, closely to loosely arranged. Floral bracts conspicuous, semipersistent, lanceolate to ovate-cordate. Calyx-tube broadly campanulate, 2-lipped, upper lip truncate, emarginate or short-lobed, the lower lip with 3 deltoid to lanceolate lobes. Corolla papilionaceous, pale to bright yellow, the standard orbicular or nearly so with recurved sides. Ovary sessile or almost so. Legume sessile or very short-stipitate, mostly linear, compressed and not inflated.

A genus of perhaps 20 species of southeastern and western North America and Asia. (Name derived from the Greek *thermos* = lupine and *opsis* = appearance.)

1. Stipules mostly 4 cm or more in length, usually obtuse, broadly clasping the stem; bracts ovate; pedicels less than 5 mm long; legumes densely villous and closely pressed against the rachis 1. *T. villosa*.

1. Stipules 3.5 cm or less in length, acute, not clasping the stem; bracts linear to lanceolate; pedicels usually more than 5 mm long; legumes at most appressed-pubescent, divaricate and neither strongly ascendent nor appressed.

2. Calyx-tube externally noticeably pubescent; bracts usually equaling or longer than the pedicels; lateral calyx-lobes typically 2 mm or more in length; mostly found in the Piedmont 2. *T. mollis*.

2. Calyx-tube glabrous or very nearly so and often glaucous; bracts mostly less than or equaling the pedicels in length; lateral calyx-lobes typically less than 2 mm long; found in the mountains 3. *T. fraxinifolia*.

1. THERMOPSIS VILLOSA (Walt.) Fern. & Schub., Rhodora 50: 201. 1948.

Baptisia villosa (Walt.) Nutt., Gen. N. Am. Pl. 1: 281. 1818 but not as to plant intended which was a *Baptisia*.

T. caroliniana M. A. Curtis, Am. Jour. Sci. I. 44: 80. 1843.

Erect, perennial herb mostly about (0.6)0.8-1.2(1.6) m high, often unbranched but when branched the lateral branches completely vegetative and usually short and but little developed; the stem usually stout and glabrous or but sparingly villous beneath the inflorescence. Stipules conspicuous, large and foliaceous, oblong, oblong-ovate or even oblong-elliptic, acute to obtuse at both apex and base, broadly sessile and clasping with the basal lobe, those of the main stem and of the principal leaves usually (2)3.5-5(6.5) cm long and (1)1.5-3.0 cm wide, those of the lateral branches and upper-most leaves occasionally somewhat smaller. Petioles widely divergent to ascendent, striate, grooved above, glabrous to sparsely spreading-villous, mostly about (2.5)4-6(8) cm long. Leaflets lanceolate, elliptic to oblanceolate or obovate, acute to broadly rounded at the apex and abruptly to gradually tapering to the base with their petiolules about 1-2 mm long and sparsely to moderately villous; the upper surface of the leaflets glabrous or rarely appressed-pilose near lower part of the midvein; the margin often villous-ciliate and the lower surface somewhat glaucous and sparsely to moderately villous especially along the veins; mostly about (4)5-8(10) cm long and (1.5)2.5-4(5) cm wide. Racemes terminal, stiffly erect, about (0.5)1-3(4.5) dm long and loosely to compactly flowered with the rachis very densely tawny tomentose and the flowers borne on tomentose, strongly ascendent, short, stout pedicels about 1-4(5) mm long and closely subtended by an ovate to broadly elliptic, usually acute bract of about (3)4-7(9) mm long and about 4-6 mm wide and invariably exceeding the length of the pedicel and varying from densely tomentose on the lower surface to glabrous or nearly so except along the principal veins, along the margins and near the base, deciduous soon after or a little prior to the fall of the petals. Calyx densely tawny-tomentose externally throughout and internally at the upper margin; the tube broadly campanulate, about 3-5 mm long with a hypanthium of about 2 mm long; the two upper lobes fused and only slightly emarginate, the lowermost and lateral lobes ovate to broadly triangular, acute, usually almost equal, about 2-3 mm long. Corolla with long-clawed, yellow petals; the standard strongly reflexed and about 3-5 mm shorter than both the wing and keel-petals, its blade orbicular or nearly so and conspicuously emarginate at the apex, about 9-12 mm in diameter, its claw about 4-5 mm long; the wing petals with an oblong blade about 1.2-1.4 cm long with a conspicuous ruffled or puckered area along the upper edge above the upper basal appendage of about 2 mm long and also with a much smaller lower lobe, the claw

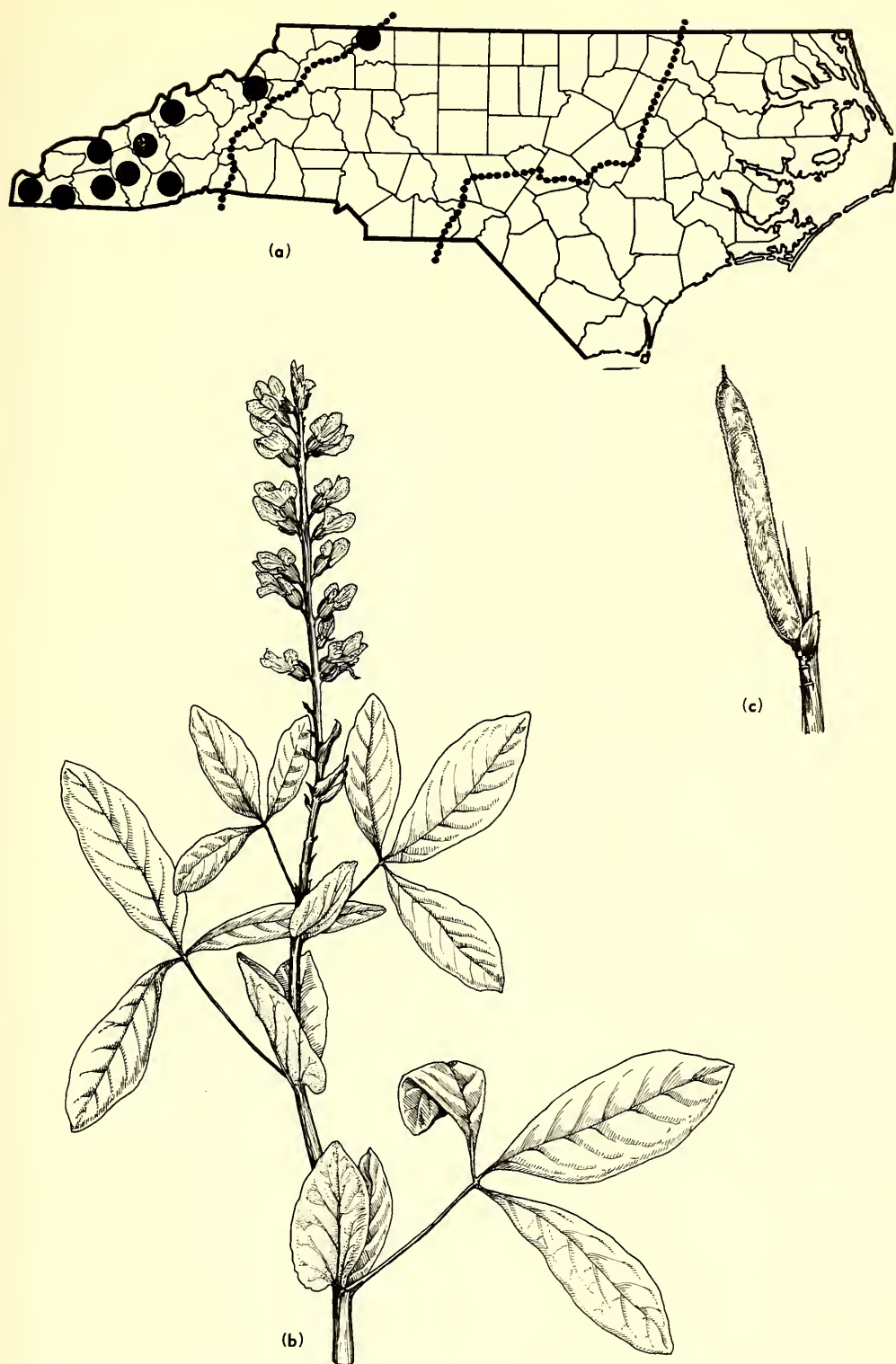


Fig. 19. *Thermopsis villosa*. (a) Distribution; (b) Flowering branch; (c) Fruit.

about 5 mm long; the keel-petals coherent above, the blades oblong to oblong-obovate, about 1.2-1.4 cm long and with an upper basal lobe, the claw about 5 mm long. Filaments glabrous and about 1.2-1.5 cm long. Ovary linear, long-villous especially along the margins, sessile or very nearly so, about 7-9 mm long. Legumes strongly ascendent and closely appressed against the compactly congested fruiting rachis, linear, about (3) 4-5 (6) cm long and about 6-8 mm wide, densely grayish, tawny or even rufous tomentose with long villous pubescence and with the slender, stiff, somewhat arching style often persisting and about 5-9 mm long.

DISTRIBUTION: Western North Carolina west to central Tennessee and south into both northern Georgia and Alabama.

2. THERMOPSIS MOLLIS (Michx.) M. A. Curtis ex Asa Gray, Mem. Am. Acad. II. 3:47. 1848.

T. Hugerii (Small) Small, Fl. SE. U. S. 596, 1931. 1903.

Erect, perennial herb from an often extensive rhizome of about 2-3 mm in diameter and the aerial stems about (2) 4-6 (9) dm high with few to several, spreading, vegetative branches above of usually less than 1.5 (2.5) dm long; more or less moderately to densely appressed to even weakly spreading pubescent throughout or becoming glabrate below and with the stem and branches more or less in general terete but usually strongly but obscurely angled and conspicuously striate. Stipules closely resembling the leaflets in both texture and pubescence; those of the principal leaves mostly oblong to oblong-lanceolate or even ovate to lanceolate and about 1.2-2.5 (3.2) cm long, acute to obtuse at the apex and attached by a relatively narrow base and not at all broadly clasping and lacking a basal flap-like lobe; those of the upper leaves and of the lateral branches usually much smaller and often linear-oblong and mostly about 4-10 mm long and 2.5 mm or less wide. Petioles wide-spreading to ascendent, grooved above, usually appressed pubescent, about (0.5) 1-2 (3) cm long. Leaflets elliptic, oblanceolate to obovate, acute to broadly rounded at the apex and basally gradually tapering or cuneate on usually densely short-pubescent petiolules about 0.8-1.5 mm long; the upper surface of the leaflets moderately appressed to weakly spreading pubescent especially along the principal veins; the lower surface moderately to densely pubescent; mostly (2.5) 4-7 (8.5) cm long and (1.2) 2-3 (4) cm wide. Raceme peduncled and terminal

(usually but one produced on each aerial stem regardless of the degree of branching), gently archingly ascending to more or less strictly erect, about (0.6) 1-2.5 (3.8) dm long and loosely to compactly flowered with the rachis moderately to densely somewhat appressed to spreading short-pilose or short-pubescent and with strongly ascendent, appressed to weakly spreading, short-pubescent pedicels of about 0.5-1.0 (1.5) cm long and subtended by an ovate, lanceolate, narrowly elliptic or even linear, long-persistent, acute or less commonly obtuse bract about (4) 5-12 (15) mm long and about 2-6 mm wide, often exceeding or equaling the pedicel in length but not uncommonly as much as twice exceeded by it, usually densely pubescent below but glabrous to but sparingly pubescent above. Calyx moderately to densely (or rarely but sparsely) upwardly appressed, short-pubescent externally and densely so internally along the margin and the lobes but otherwise glabrous within; the broadly campanulate tube about 3-5 mm long with a gradually tapering hypanthium of about 1-1.2 mm long; the two upper lobes largely united except for the upper triangular-dentate free tips about 0.7-1.2 mm long; the lateral lobes triangular-lanceolate, about 2-4.5 mm long, acute; the lowermost lobe similar but usually slightly longer. Corolla with long-clawed bright yellow petals; the standard strongly reflexed and about 3-5 mm shorter than the wing or keel petals, its blade more or less suborbicular and conspicuously emarginate, about 8-10 mm long and 1.2-1.4 cm wide, its claw about 2 mm long; the wing-petals with an oblong to oblong-obovate blade of about 1.1-1.3 cm with a puckered area along the upper margin above and partly extending onto the upper basal lobe of about 1 mm and with a smaller, less pronounced, basal appendage on the lower side, the claw about 4-5 mm long; the keel-petals coherent above, their blades oblong to oblong-obovate, about 1.2-1.4 cm long and with basal lobe of about 2-2.5 mm long along the upper side, the claw about 4-5 mm long. Filaments glabrous and about 12-15 mm long. Ovary linear, densely appressed-pubescent, about 9-11 mm long on a stipe of about 2-3 mm. Legume compressed, ascendent to strongly spreading, straight to moderately arching, narrowly linear and about (2) 4-7 (9.5) cm long and 3.5-6 mm wide except where narrowed to about 2 mm through the abortion of an ovule, densely but inconspicuously appressed-pubescent and often with the arching style persistent and about 4-7 mm long.

DISTRIBUTION: The Piedmont and west into the mountains from central Virginia south into northern Georgia and west into Tennessee.



Fig. 20. *Thermopsis mollis*. (a) Distribution; (b) Leafy and flowering branch; (c) Leaf and stipules; (d) Calyx and bract.

3. *THERMOPSIS FRAXINIFOLIA* M. A.
Curtis, Am. Jour. Sci. I. 44:81. 1843.

Erect, perennial herb about 3-9 dm tall with several to numerous, slender, geniculate and often widely divergent branches up to 4 dm long, terete and striate to inconspicuously angled, glabrous or rarely very sparsely short-pubescent, often glaucous and especially so above. Stipules very similar to the leaflets in texture and pubescence, mostly linear, linear-oblong or lanceolate, about (0.5)1-2.5(3.5) cm long and (1.5)3-8(10) mm wide, apically acute and basally narrowly attached and not broadly clasping and completely lacking a basal flap-like lobe. Petioles widely divergent to ascendent, grooved above, glabrous to moderately short-pubescent, about (1)1.5-3(4) cm long. Leaflets usually elliptic or rarely oblanceolate, typically tapering to an acute or rarely even acuminate apex but occasionally apically obtuse, typically with a cuneate base and with a usually sparsely to moderately short-pubescent petiolule of about 0.7-1.2 mm long; the upper and lower surfaces of the leaflets glabrous or but very sparsely short-pubescent along the principal veins or occasionally moderately appressed-pubescent throughout below, mostly (3)4-7(8) cm long and (1)1.5-3(3.5) cm wide. Racemes peduncled and terminal and often with 2 to several produced on each aerial stem, gently archingly ascendent to erect or occasionally somewhat drooping, about (0.5)1-3(5) dm long and loosely flowered; the rachis glabrous or rarely very sparsely short-pubescent, commonly somewhat glaucous; the pedicels glabrous and often glaucous or sparsely to moderately short-pubescent, while bearing flowers mostly about 0.5-1(1.5) cm long and elongating somewhat as fruit matures and then often 1-1.8 cm long; the subtending bract narrowly linear or even subulate to lanceolate, acute, about 3-10(14) mm long and about 0.5-3(5) mm wide, usually exceeded by the pedicel and often greatly exceeded by it but occasionally as long or even longer than the pedicel, glabrous to very sparingly short-pubescent, usually falling with or soon after the petals. Calyx glabrous externally (or occasionally very sparsely appressed short-pubescent near the base) and often glaucous, internally tomentose on the lobes and margin but otherwise glabrous; the tube broadly campanulate, about 2.5-4.5 mm high with a gradually tapering hypanthium of about 1-1.2 mm high; the two upper lobes mostly united with short, free, triangular-dentate tips of about 0.2-0.8 mm long; the lateral lobes triangular to triangular-lanceolate, about 1-2 mm long, acute; the lowermost lobe similar to the lateral but usually slightly longer. Corolla with long-

clawed light-yellow petals; the standard strongly reflexed, about 3-4 mm shorter than the wing- or keel-petals, obovate and with its blade not sharply differentiated from the gradually tapering "claw", the petal about 9-13 mm long and 10-12 mm wide, emarginate at the apex; the wing-petals with an oblong to obovate blade of about 9-11 mm long and about 4-6 mm wide with a puckered area on about the lower third of the upper side of the petal and extending onto the upper basal lobe of about 1.5-2 mm long and with the lower basal lobe smaller and much less pronounced and protruding about 0.5 mm, the claw about 4-6 mm long; the keel-petals coherent above, their blades oblong to oblong-obovate, about 1.0-1.2 cm long and with a basal lobe along the upper side of about 1.5-2.0 mm long; the claw about 4-6 mm long. Filaments glabrous and about 12-14 mm long. Ovary linear, about 6-8 mm long, densely upwardly appressed pubescent on a short stipe of about 1 mm long and terminated by a glabrous, slender, arching style of about 4-5 mm. Legume compressed, ascendent to strongly spreading, narrowly linear to rarely oblong, mostly (2.5)4-7(10) cm long and about 4-6 mm wide except where narrowed to about 2 mm through the abortion of an ovule, densely but very inconspicuously appressed-pubescent and often with the style persistent.

DISTRIBUTION: Mountains of western North and South Carolina and northern Georgia.

The name is here attributed solely to Curtis although the authority is almost invariably cited as "(Nutt.) M. A. Curtis." However, Nuttall never published the alleged basionym, *B. fraxinifolia* and Torrey and Gray merely listed it in synonymy as a manuscript name of Nuttall's which they did not accept. Therefore, *T. fraxinifolia* should neither be cited as "(Nutt.) M. A. Curtis" nor "(Nutt. ex T. & G.) M. A. Curtis."

There is considerable question yet as to the plant that Nuttall actually referred to by this manuscript name. There is some indication that Nuttall's original determination as *Baptisia mollis* (= *Thermopsis mollis*) was correct. This point requires further investigation.

In any event *T. fraxinifolia* was first validly published by Curtis and it dates from 1843; as a species it should be attributed to Curtis with no parenthetical authority.



Fig. 21. *Thermopsis fraxinifolia*. (a) Distribution; (b) Flowering branches; (c) Leaf and stipules; (d) Calyx and bract; (e) Fruit.

10. CROTALARIA L., Sp. Pl. 714. 1753;
Gen. Pl. ed. 5. 320. 1754.

Annual to perennial, erect to prostrate herbs or shrubs. Leaves simple or palmately 3-foliate (rarely 5-7-foliate), estipellate. Stipules obsolete to large and conspicuous, free from the petiole, occasionally decurrent along the stem. Flowers rarely solitary but typically borne in terminal racemes or the racemes apparently opposite the leaves. Bracts subtending the pedicel small to large or even folioaceous; bractlets paired, typically very small to rarely large, borne on the pedicel or apparently at the very base of the calyx-tube or rarely absent. Calyx gamosepalous, the tube often obliquely campanulate, the lobes often free and nearly equal or sometimes the 2 upper and the 3 lower slightly coherent and thus the calyx bilabiate. Corolla typically exceeding the calyx-lobes with yellow, yellow and dark purple striped, purple or blue petals. Standard orbicular to ovate, short-clawed, exceeding the wings and keel in length; the wings oblong; the keel usually closely enveloping the stamens and pistil and often bent and thus scythe-shaped or the tip extended and rostrate. Stamens 10, monadelphous, the sheath typically somewhat cleft on one side. Anthers dimorphic, basifixed and borne on alternating long and short filaments; the long filaments with small, subglobose anthers and the shorter filaments with larger, linear anthers. Ovary typically sessile but rarely stipitate with the style incurved or abruptly inflexed and barbellate above along the inner side. Legume typically several-to many-seeded (but rarely 1-seeded), globose to oblong or cylindrical, sessile or rarely stalked, greatly inflated. Seeds small.

A genus of perhaps 300 species of the tropics and warm temperate regions of both hemispheres but the majority native to Africa. (Name derived from the Greek, *crotalon* = rattle, aluding to the loose seeds rattling in the inflated pods. The common name, RATTLEBOX or RATTLEPOD, also makes reference to this feature.

1. Leaves 1-foliate.
2. Standard less than 1.5 cm long, equaling or shorter than the calyx-lobes; leaves linear, lanceolate or elliptic, broadest at or near the middle or below.
3. Pubescence of stems, leaves and flowers strigose and closely appressed 1. *C. Purshii*.
3. Pubescence of stems, leaves and flowers villous and loosely spreading.
4. Stems decumbent or trailing; leaves oval

to suborbicular, mostly 2-3-times as long as wide, broadly rounded at both ends; stipules commonly small or absent, rarely a few large and decurrent 2. *C. angulata*.

4. Stem erect or strongly ascendent; leaves elliptic to linear-lanceolate, often more than 3-times as long as wide, usually tapering to both ends; stipules, at least some of them, conspicuously decurrent 3. *C. sagittalis*.
2. Standard 1.5 cm long or more, much longer than the calyx; leaves oblanceolate to obovate and tapering to the base, broadest above the middle and usually near the apex.
5. Stipules and bracts ovate, 5 mm or more in length and at least half as wide, semipersistent; calyx glabrous or nearly so 4. *C. spectabilis*.
5. Stipules and bracts subulate, minute, less than 2 mm long, caducous; calyx appressed short-pubescent .. 5. *C. retusa*.
1. Leaves 3-foliate.
6. Leaflets broadly rounded at apex, less than 5-times as long as wide; calyx-tube densely appressed short-pubescent; the longest calyx-lobe about 3-5 mm long and equaling or nearly so the tube in length 6. *C. mucronata*.
6. Leaflets acute at apex, more than 6-times as long as wide; calyx-tube glabrous or nearly so; the longest calyx-lobe about 1.5-2 mm long and usually half the length of the tube or less 7. *C. intermedia*.

As might be expected the species which cause difficulties in our area to the taxonomist are the closely related group centering about *C. sagittalis*. The North Carolina representatives can be separated with relative ease but there still lingers a doubt about the biological merit of these species based as they are largely on pubescence-types. In reference to *C. sagittalis*, Seen wrote (1939, 318 + 319): "In Virginia and North Carolina it is simply and rather sharply delimited from its congeners, *C. angulata* Mill. and *C. Purshii* DC., but when specimens from the whole of the range of *C. sagittalis* L. are studied there is seen to be a series of intergrading forms showing its close relationship with *C. Tuerckheimii* Senn, *C. pilosa* Mill., *C. stipularia* Desv. and *C. maritima* Chapm., as well as *C. Purshii* DC., and *C. angulata* Mill." Further study is obviously needed.

1. *CROTALARIA PURSHII* DC., Prodr. 2: 124. 1824.

C. Purshii var. *bracteolifera* Fern., Rhodora 49: 149. 1947.

Perennial herb from a woody tap root 1 dm or more in length and 5-10 mm or more thick with numerous ascendent simple or sparingly branched stems about 2-4(5) dm high and about 1 mm in diameter, with a usually dense covering of closely appressed strigose hairs. Stipules, at least those of the upper leaves, present and conspicuous, inversely sagittate and often decurrent half the length of the internode or more. Petioles short, about 1-2 mm long. Leaves simple, strigose; the principal upper leaves linear to lanceolate, mostly 3-6(8) cm long and 4-10 mm or so wide, usually tapering to the base and with a usually acute but occasionally obtuse apex; the lower leaves usually oblong to somewhat spatulate, usually obtuse, about 2-3 cm long and 6-15 mm wide. Peduncles about 3-12 cm long and about 1 mm in diameter bearing several bracts and near its apex 2-6 flowers. Pedicels slender, about 6-10 mm long, subtended by linear bracts 5-10 mm long and less than 1 mm wide. Calyx-tube about 2 mm high, closely associated with 2 linear, appressed bractlets about 4-6 mm long. The calyx 2-lipped, the upper of 2 lobes partially fused, about 7-9 mm long and 2-2.5 mm wide, acute; the lower lobes somewhat narrower. Calyx, pedicel, bracts and peduncle all strigose. Petals yellow, equaling or exceeding the calyx in length. Ovary glabrous. Legume glabrous, inflated, oblong, obtuse, about 2.5-4 cm long and about 1 cm thick.

DISTRIBUTION: Southeastern Virginia south to Florida and west to Texas. The typical variety is also known from Mexico.

Fernald's proposed variety *bracteolifera* differs in being more branched especially at the base, in possessing narrower leaves (narrowly linear-lanceolate and usually only 2-7 mm wide) and more numerous flowers or bracts ("bractlets") (7-14) which are not restricted to the upper portion of the peduncle. It is also apparently to be found in bogs and savannahs in contrast to the dry sandy pinelands of the typical element. At the present time collections are too few to determine definitely the validity of this variety but I suspect it to be no more than an extreme form. In the more southerly portion of the range of this species, plants with very narrowly linear leaves are more abundant and there seems to be no ecological separation be-

tween the two named varieties since Fernald has annotated specimens which came from "dry sandy pine barrens" as belonging to his variety *bracteolifera*.

The specimen indicated on the map by the dot in Clay County appears so far out of range that suspicion as to labeling naturally arises. However Senn (1939, p. 345) cites specimens from parts of Georgia which are closely adjacent.

2. *CROTALARIA ANGULATA* Mill., Gard. Dict. ed. 8., No. 9. 1768.

C. rotundifolia in the sense of most authors but not the same as the basionym, *Anonymos rotundifolia* Walt. (see Fernald, Rhodora 50: 202+203. 1948.)

C. ovalis (Michx.) Pursh, Fl. Am. Sept. 2: 469. 1814.

Perennial herb from a deep, 1-2 dm long or more, woody taproot often 5-10 mm or more thick with numerous decumbent to ascendent stems about 1-3(4) dm long and 1-1.5 mm in diameter often forming a matted carpet, densely spreading villous-pubescent throughout. Stipules usually absent or wanting or more rarely a few of the upper decurrent and inversely sagittate. Petioles short, about 1-2 mm long. Leaves simple, oval, suborbicular, elliptic, mostly 1-3 cm long, usually not more than 3-times as long as wide, usually broadly rounded at both ends. Peduncle 3-15 cm long, slender, about 1 mm or less in diameter with about 3-6 flowers. Calyx-tube about 2 mm long, usually with 2 linear bractlets at base about 5-7 mm long and 0.5-1 mm wide. Calyx-lobes linear-lanceolate to elliptic, 5-10 mm long, acute to acuminate, unequal, the two upper the larger and sometimes as much as 2-times as broad as the lower. Petals yellow, equaling or exceeding calyx by about 1-3 mm; the standard about 8-12 mm long. Ovary oblong, about 4-7 mm long and 2 mm wide, compressed, glabrous. Legume inflated, oblong, more or less rounded at both ends, glabrous, mostly 2-3 cm long, 8-12 mm wide.

DISTRIBUTION: Coastal Plain of the Southeast from southeastern Virginia to Louisiana; also found abundantly in Mexico and Guatemala.

Closely related to the above is *C. rotundiflora* [Walt.] Gmel. (= *C. maritima* Chapm.) which differs in possessing closely appressed rather than spreading pubescence and which, in spite of the range stated by Small ("Fla. to La. and N. C."),

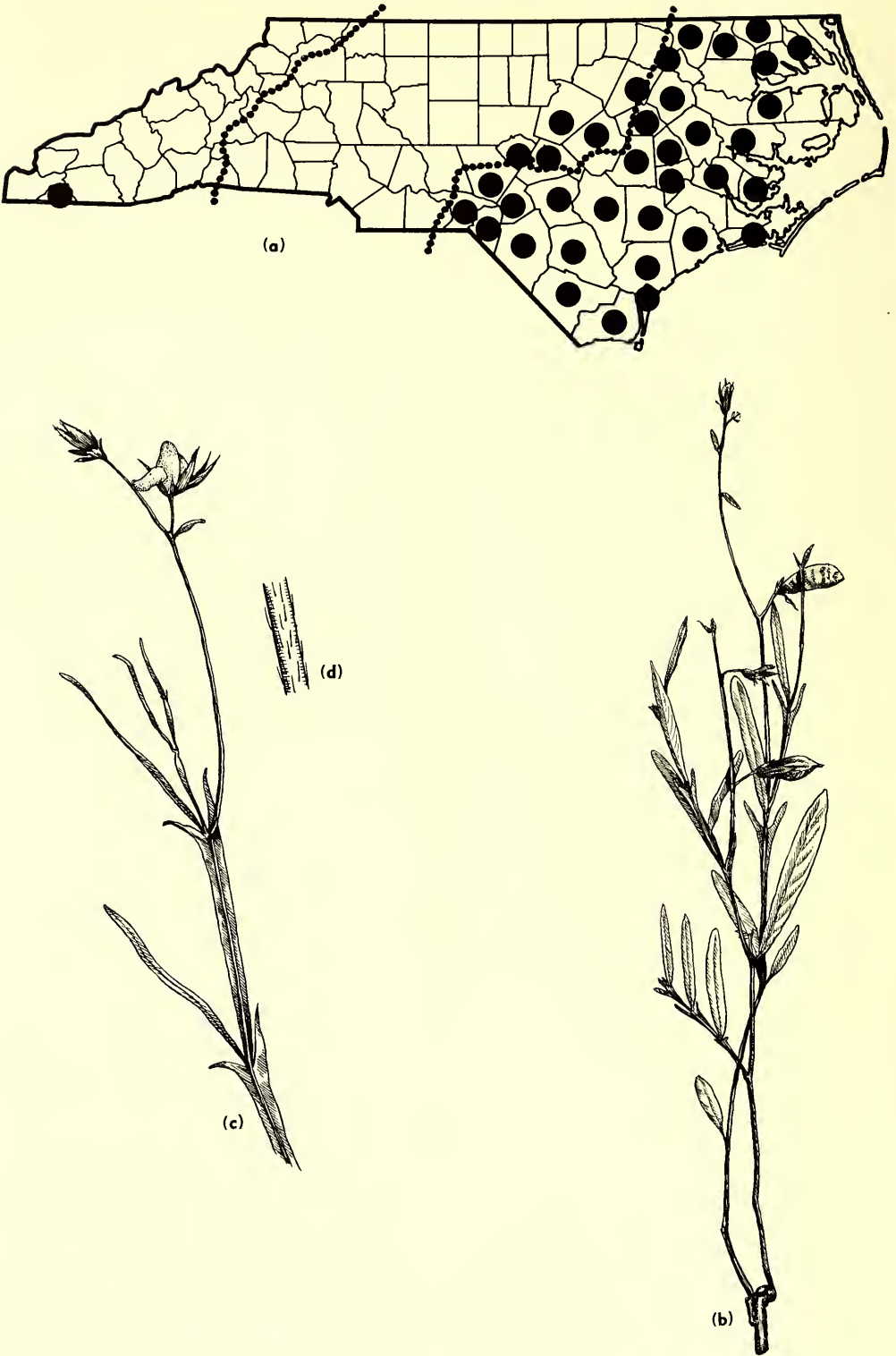


Fig. 22. *Crotalaria Purshii*. (a) Distribution; (b) Habit sketch with fruit; (c) Detailed sketch showing stipules; (d) Enlarged section of stem showing pubescence.

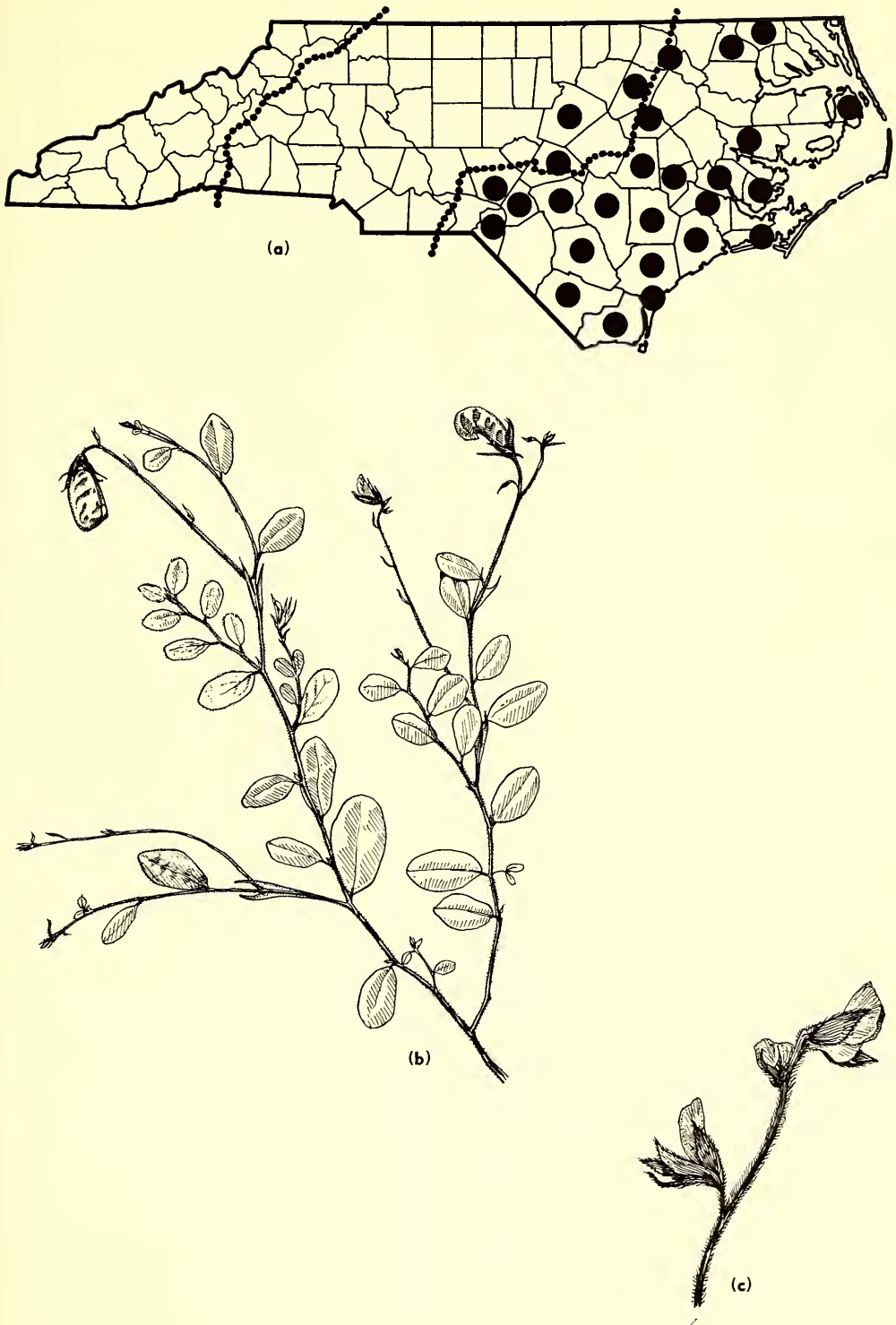


Fig. 23. *Crotalaria angulata*. (a) Distribution; (b) Habit sketch with fruit; (c) detailed sketch of flowering branch.

does not appear to be of our flora. A specimen of *C. W. Hyams* (UNC) of *C. angulata* from "Statesville, N. C." should, like so many other coastal plain plants attributed to Iredell Co. solely on the basis of his collections, be ignored.

3. CROTALARIA SAGITTALIS L., Sp. Pl. 714. 1753.

C. sagittalis var. *oblonga* Michx., Fl. Bor. Am. 2: 55. 1803.

Annual or perennial herb with simple or branched, erect or ascendent stems about (1)2-3.5(5) dm high with villous, loosely spreading or ascendent pubescence throughout. Stipules, of the upper leaves at least, present and conspicuous, commonly decurrent for half or more of the length of the internode, typically 2-3 mm or more wide and inversely sagittate. Pedicels about 1 mm long. Leaves simple, elliptic to lanceolate or even linear, tapering to base and apex, mostly about 3-8 cm long and 8-15 mm wide with abundant, spreading, villous hairs. Peduncle about 1-6 cm long with 2-4 flowers on pedicels 4-10 mm long subtended by linear bracts about as long as the pedicels. Calyx-tube about 2 mm long and closely associated with 2 linear, closely-appressed bractlets mostly 4-6 mm long. Calyx-lobes lanceolate to linear, unequal; the upper the largest, about 8-10 mm long and 2.5-3.5 mm wide; the lower 3 narrower than the upper 2. Petals yellow, usually slightly shorter than the calyx. Ovary glabrous. Legume oblong, about 2-3.5(4) cm long and about 1 cm thick.

DISTRIBUTION: Southern Vermont to South Dakota and south to Florida and Texas. The typical variety is also reported from Mexico to Panama and in the West Indies as well. In our area at least *C. sagittalis* appears typically to be found in the Piedmont and Mountains and but rarely upon the Coastal Plain. (The specimen mapped from Pender County is questionable being a collection of Hyams whose range "extensions" are all suspect.)

Fernald recognized Michaux's variety *oblonga* distinguishing it by its possessing "all leaves, including the bracteal ones, broadly elliptic-oblong." Its range is stated to be from Florida to Mexico and locally north to southeastern Virginia. This seems to me to be but an extreme tendency with a very sporadic distribution along the Coastal Plain. Such extremes seem impossible to delimit objectively and since this

one has no discrete range of its own, little is apparently to be gained by formally recognizing it.

4. CROTALARIA SPECTABILIS Roth, Nov. Pl. Sp. 341. 1821.

C. Retzii A. S. Hitchc., Rep. Mo. Bot. Gard. 4: 74. 1893.

Erect annual herb about 0.5-1(2) m high with thick, coarsely ribbed stems about 5-15 mm thick and a woody taproot about 1-2 dm long; the stems puberulent to glabrate and commonly dark purplish and somewhat glaucous. Stipules usually tardily deciduous, ovate-lanceolate, usually acute, about 5-8 mm long and 4-6 mm wide. Petioles short, often stout, 4-10 mm long. Leaves simple, obovate, with cuneate base and broadly rounded but often apiculate apex, the principal ones mostly 5-15(20) cm long but becoming smaller above, inconspicuously appressed short-pubescent beneath. Racemes several to numerous, clustered near the end of the stem, terminal or axillary, about 1.5-5 dm long with numerous, spirally-arranged, showy flowers. Pedicels (0.5)1-2 cm long, slender, glabrous, purplish; usually with about 2 minute bractlets about 1 mm long borne near middle of the pedicel or slightly below and subtended by a large, ovate to ovate-lanceolate, cordately-clasping, acute to acuminate, persistent bract about 7-12 mm long and 5-9 mm wide. Calyx glaucous and glabrous or nearly so, purplish; the tube about 5-6 mm high; the lobes about 6-12 mm long, unequal, acute, deltoid. Petals yellow, the standard about 1.5-2.5 cm long, sub-orbicular, about 15-20 mm broad, somewhat emarginate, about half-again to twice as long as the wing petals and keel which is densely pubescent along the fused edge. Legume about 3-5 cm long, more or less oblong but broadening apically, wide-spreading or drooping.

DISTRIBUTION: Native of India but widely introduced throughout the Old World tropics and occasionally in the Antilles and Central America; locally in the southeastern states from Virginia and Missouri southward. Occasionally grown as a green manure crop and persisting about pastures, old fields and roadsides in North Carolina. This species reportedly has caused livestock poisoning.

5. CROTALARIA RETUSA L., Sp. Pl. 715. 1753.

Erect annual herb about 3-9 dm high or more with a woody taproot about 1-3 dm long and strigillose, striate stems. Stipules

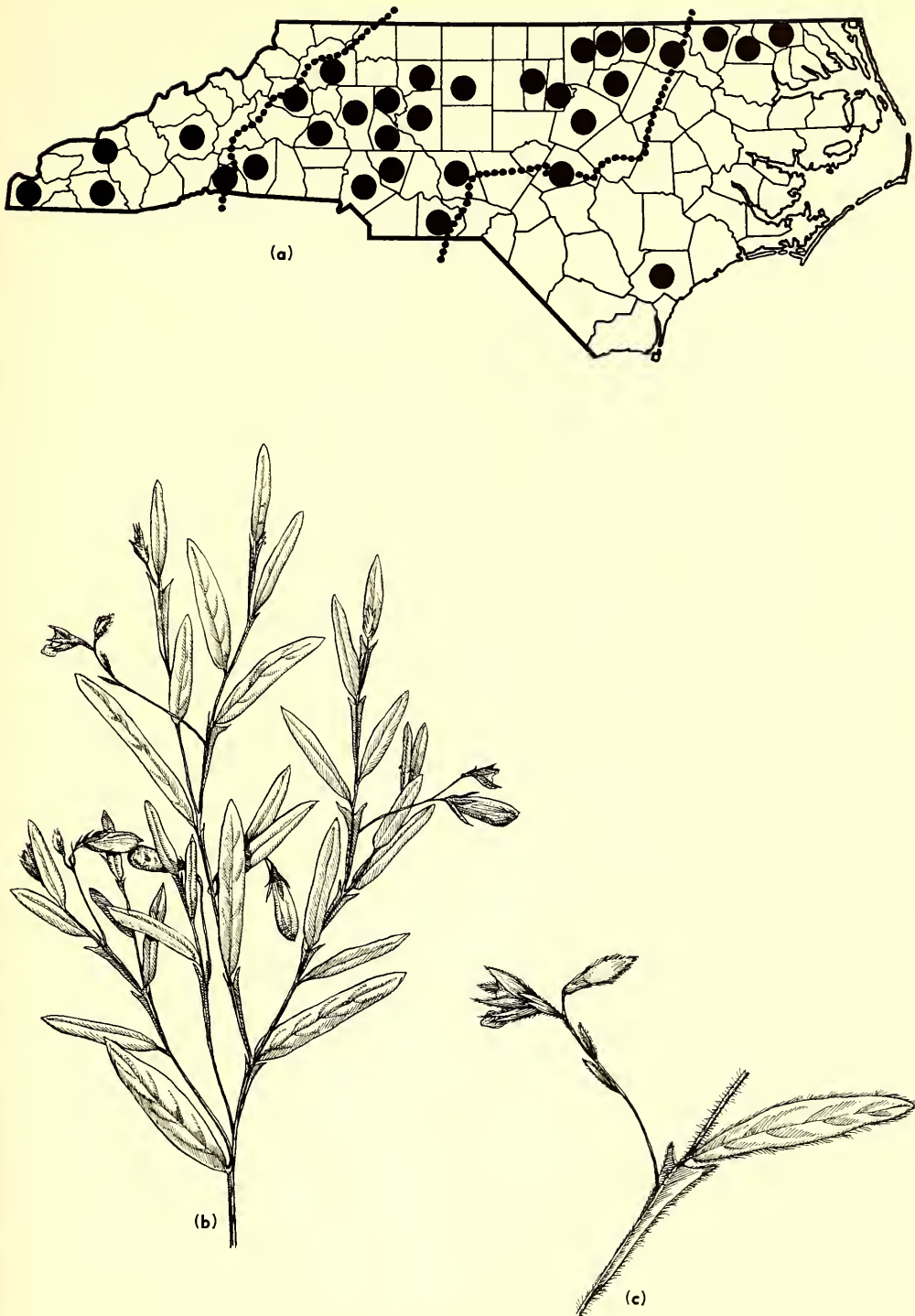


Fig. 24. *Crotalaria sagittalis*. (a) Distribution; (b) Habit sketch showing fruit; (c) Enlarged sketch of stem.

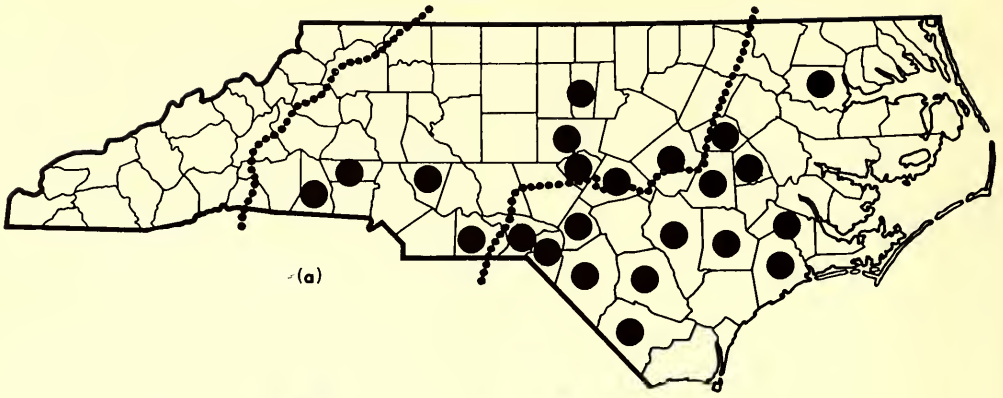


Fig. 25. *Crotalaria spectabilis*. (a) Distribution; (b) Stem, upper leaves and flowers with broad subtending bracts.

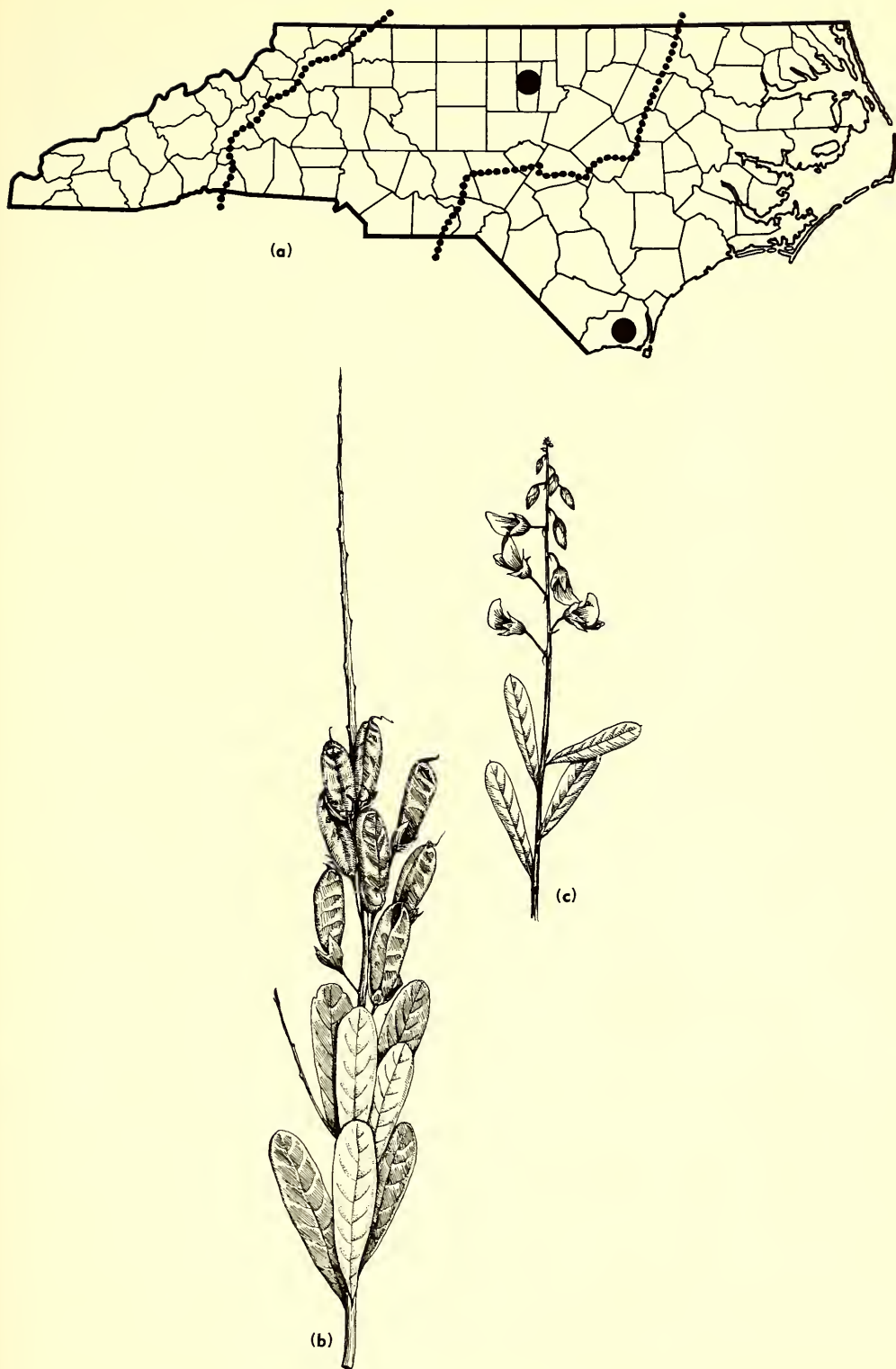


Fig. 26. *Crotalaria retusa*. (a) Distribution; (b) Stem, upper leaves and maturing fruit; (c) Flowers with small subulate subtending bracts.



Fig. 27. *Crotalaria mucronata*. (a) Distribution; (b) Upper leaves and flowering raceme; (c) Fruiting raceme.

minute, about 1 mm long, setaceous, caducous. Petioles short, about 1-2 mm long. Leaves simple, obovate, oblanceolate, spatulate, obtuse or more commonly broadly rounded, often slightly apiculate or somewhat retuse, cuneate, about 3-8 cm long and 1-1.5 (2) cm broad, shortly appressed-pubescent below but glabrous above. Racemes one to several, terminal, 1-2 (3) dm long with usually loosely arranged, showy flowers. Pedicels mostly about 5-12 mm long, strigillose and with 2 minute, often caducous bractlets less than 1 mm long attached about the middle and subtended by a minute, subulate, caducous bract about 1-2 mm long. Calyx moderately to densely strigillose; the tube broadly campanulate, about 5-8 mm long; the lobes unequal and varying from about 5-12 mm long, acute, lanceolate to ovate-lanceolate. Petals yellow; the standard suborbicular, about 2-2.5 cm long, about twice as long as the wing and keel petals, the keel densely ciliate along the fused edge. Legume more or less cylindrical, about 2.5-4 (5) cm long and about 1 cm thick, glabrous.

DISTRIBUTION: Widespread native of the Old World tropics; widely naturalized throughout the West Indies, found in Central America and naturalized in Florida and apparently becoming naturalized in other parts of the Southeast. However, it is very doubtful if this species is established in the flora of North Carolina at the present time.

6. *CROTALARIA MUCRONATA* Desv.,
Jour. de Bot. 3: 76. 1814.

C. striata DC., Prodr. 2: 131. 1825.

Erect branching annual herb up to about 1-1.5 (2) m high, glabrous to minutely strigillose throughout, often somewhat woody at base and with a taproot 1.5-3 dm or more in length. Stipules minute, setaceous, about 3-5 mm long. Petioles mostly 2-6 cm long, sturdy, about 1-2 mm in diameter. Leaves palmately 3-foliolate; the leaflets oval, elliptic to obovate, usually broadly rounded at the apex, commonly emarginate and slightly apiculate, about (2) 3-6 (9) cm long, commonly 1.5-4 (6) cm wide, glabrous above and minutely strigillose beneath. Racemes terminating the main stem or principal branches, about 1-3 dm long with usually densely clustered flowers. Calyx densely appressed short-pubescent or strigillose; the tube about 2-3 mm high; the lobes 3-5 mm long, lanceolate, attenuate. Petals yellow and often with brownish lines; the standard about 1-1.2 cm long, suborbicular; the keel petals rather abruptly bent, about 1.2-1.6 cm long. Legume yellowish, more

or less glabrous, inflated, about 3-4.5 cm. long and about 8-10 mm in diameter.

DISTRIBUTION: Tropics of both the Old and New World and locally introduced into the Southeast.

7. *CROTALARIA INTERMEDIA* Kotschy,
Sitzungsab. Akad. Wien. 362. 1864.

Erect branching annual up to 1.5 m high with minutely strigillose, strongly ribbed and grooved branches and possessing a well-developed tap-root. Stipules lacking. Petioles mostly (1) 2-3 (4.5) cm long and 1 mm or less in diameter, minutely strigillose. Leaves palmately 3-foliolate; the leaflets linear to linear-lanceolate, tapering both to the base and to the acute, apiculate apex, about 4-9 (12) cm long and 4-10 (12) mm wide, glabrous above but abundantly strigillose beneath. Racemes terminating the main stem and principal branches, about 1.5-4 dm long with a ribbed, strigillose rachis and a densely strigillose pedicel about 4-7 mm long subtended by a small, spreading, narrowly triangular-dentate to lanceolate bract about 1-2 mm long and with 2 inconspicuous, narrowly triangular-dentate to lanceolate bractlets about 0.4-1.8 mm long at base of the calyx-tube. Calyx glabrous or very sparingly strigillose near base; the tube broadly campanulate, about 4-5 mm high and 3.5-4.5 mm in diameter; the lobes unequal, linear to lanceolate, about 1.2-2 mm long. Standard bright yellow with dark reddish-brown or maroon stripes, about 1.5-2.0 cm long; the wings similar in color but longer being about 1.8-2.2 mm long; the keel petals greenish yellow and the stripes paler, about 1.8-2.2 mm long. Legume yellowish and dark reddish-purple, oblong-cylindrical, about 3-5 cm long and about 1.5 cm in diameter, densely but sometimes inconspicuously hyaline-strigillose throughout at maturity.

DISTRIBUTION: Widespread in Africa and now introduced into the Southeastern States.

An additional species of this alliance is to be expected in North Carolina being already known from at least South Carolina, Georgia, and Florida. *Crotalaria lanceolata* E. Mey., another introduced species from the Old World, escapes and apparently is becoming established in the Southeast. It has linear-lanceolate leaflets and superficially resembles *C. intermedia* but differs in having a densely strigillose calyx and much smaller flowers (less than 1 cm long).

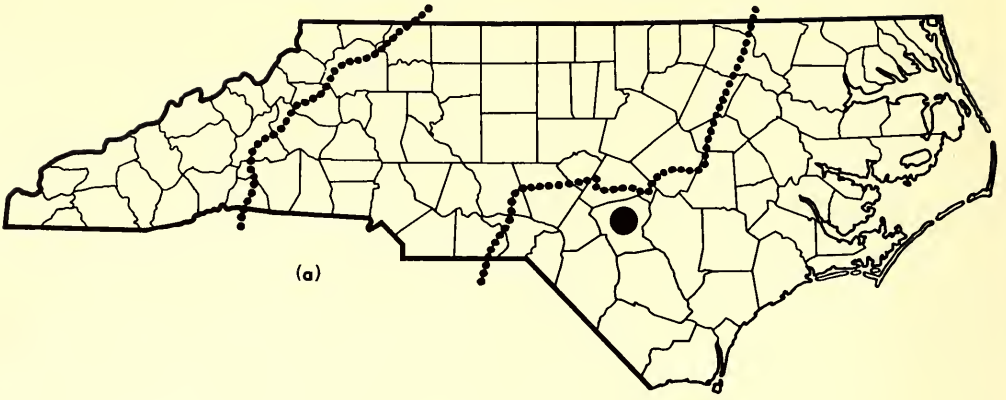


Fig. 28. *Crotalaria intermedia*. (a) Distribution; (b) Upper leaves and flowering racemes.

11. LUPINUS L., Sp. Pl. 721. 1753; Gen.
Pl. ed 5. 322. 1754.

Annual, biennial or perennial herbs or rarely shrubs with palmately compound (or rarely 1-foliolate and then appearing simple), alternate leaves with usually (3)5-15(17) leaflets. Stipules partly adnate to the petiole, often caducous, the free portion usually linear. Petioles elongate. Racemes terminal with showy, often verticillate-appearing, usually pedicellate, papilionaceous flowers about 5-20 mm long subtended by often caducous bracts. Calyx conspicuously 2-lipped with the lower lip the longest, the lips entire, minutely toothed or deeply lobed. Petals commonly blue, white, yellow or purplish; the standard broadly obovate to orbicular with typically reflexed edges; the keel arcuate and strongly incurved. Stamens monadelphous, dimorphic; filaments of two lengths, the longer with more or less globose, versatile anthers, the shorter with linear anthers and basifixes. Ovary sessile, style incurved. Legume oblong, flattened, 2-12-seeded and somewhat constricted between the seeds.

The LUPINES form a genus of perhaps 250 species of North America (where perhaps half the species occur), South America and the Mediterranean area. (Name derived from the Latin *lupus* = wolf from the superstitious belief that these plants rob the soil.)

1. Leaves palmately compound, mostly 7-11-foliolate, leaves and stems dying back to the ground in the fall 1. *L. perennis*.
1. Leaves 1-foliolate and hence appearing simple, the leaves and stems evergreen and persisting over-winter.
2. Petioles with short and appressed pubescence; standard blue with a conspicuous white to creamy spot 2. *L. diffusus*.
2. Petioles with long and shaggy, spreading pubescence; standard reddish to purplish with a conspicuous deep reddish-purple spot 3. *L. villosus*.

1. LUPINUS PERENNIS L., Sp. Pl. 721.
1753.

L. gracilis Nutt., Jour Acad. Phil. 7: 115.
1834.

L. Nuttallii S. Wats., Proc. Am. Acad. 8:
526. 1873.

Erect, perennial herb about 2-6 dm high with several stems arising from a deep root-stock and glabrous or nearly so to minutely pubescent or densely shaggy-villous especially below. Stipules filiform, usually deciduous, typically united to the petiole for about 2-3 mm, about 8-12 mm long. Petioles slender, elongate, (2)5-10(15) cm long and about 1 mm in diameter, glabrous or nearly so to densely pubescent with spreading-villous hairs 2-3 mm long. Leaves palmately compound, usually with 7-11 typically oblanceolate leaflets about 1.5-5 cm long and mostly 3-12 mm wide and generally obtuse (but rarely acute) and mucronulate, glabrous or nearly so to densely long-strigose or villous. Racemes mostly 1-2(3) dm long with numerous showy flowers spirally arranged or appearing somewhat verticillate with glabrous to densely pubescent rachis. Pedicels ascending, slender, mostly 3-7(10) mm long subtended by minute, subulate to linear, caducous bracts about 3-6 mm long. Calyx strongly 2-lipped, the tube about 2 mm high, the upper lip about 4-5 mm long with 2 deltoid lobes, the lower lip about 1.5-3 mm long. Petals blue (or rarely white or pinkish), mostly 1-1.6 cm long, about equal or the standard somewhat shorter, the keel-petals ciliate. Legume short-pubescent to villous, about 3-5 cm long and 8-10 mm wide, 4-6-seeded.

DISTRIBUTION: Southern Maine to southeastern Minnesota and south to Florida and Louisiana. (Phillips' concept of this species is much broader indeed including numerous taxa whose aggregate range is transcontinental.)

This species varies greatly in size and pubescence. Plants matching the characteristics of *L. Nuttallii* S. Wats. are to be found within our range but the taxonomic position and characteristics of this entity are at present questionable and much in need of further study. Small (1933, p. 681) stated the range of *L. Nuttallii* to be no further north than Georgia. Phillips (1955, p. 171) shows the range of this entity, which he treats as a variety, to be from Georgia west into Mississippi and south into northern Florida. Until further study has been made of that entity, it seems to me best to treat the variants from North Carolina so named as *L. perennis*.



Fig. 29. *Lupinus perennis*. (a) Distribution; (b) Habit sketch of flowering plant; (c) Fruit.

2. LUPINUS DIFFUSUS Nutt., Gen. 2: 93. 1818.

L. villosus var. *diffusus* (Nutt.) T. & G., Fl. N. Am. 1: 382. 1840.

L. villosus ssp. *diffusus* (Nutt.) L. L. Phillips, Res. Stud. State Coll. Wash. 23(3): 201. 1955.

Perennating stems mostly 2-4 dm or more in length, much-branched, decumbent, numerous, clustered, densely and rusty short-pubescent, diffusely spreading, arising from a stout, deep-set, woody taproot. Stipules fused for about (0.3)0.8-2(3) cm to petiole, the free portion filiform, densely pubescent, mostly 0.5-2(2.5) mm long. Petiole 1-2 mm in diameter, densely short-pubescent, mostly 3-7(10) cm long. Leaves 1-foliolate, oblong, elliptic or even obovate or oblanceolate, mostly 4-10(12) cm long and about (1.5)2-4(5) cm wide, acute to obtuse, mucronate, densely short-appressed-pubescent on both surfaces. Racemes (1)1.5-2.5(3) dm long with stout rachis densely covered with short, appressed-pubescent and with numerous, usually subverticillate flowers. Pedicels short, stout, about 1-4 mm long, densely short, rusty, pubescent and subtended by subulate, densely pubescent, caducous bract about 4-8 mm long. Calyx densely short, rusty, appressed-pubescent, strongly 2-lipped; the tube about 3-4 mm high; the upper lip about 4 mm long; the lower 3-lobed with the 2 laterals linear and about 2 mm long, the central 5-7 mm long. Petals light to deep blue, the standard with a conspicuous, often 2-lobed, cream-colored spot and mostly 1.2-1.6 cm long. Legume linear-oblong, mostly 3-4.5 cm long and about 7-9 mm wide, densely covered with appressed-ascending, elongate pubescence about 2 mm long.

DISTRIBUTION: Coastal Plain of North Carolina south to central Florida and west into Mississippi according to Small. Phillips (1955, p. 195) maps this species as occurring no further west than Alabama.

Phillips, in the above cited paper, concludes that the four previously named, simple-leaved species of the Southeastern States actually comprise but one species composed of two subspecies. Although unable to evaluate the two Floridian species proposed by Small, I believe that our two representatives warrant specific status at least until some evidence to the contrary is presented. They are sympatric in range and in my experience their habitats are the same. To my knowledge there has

never been presented any evidence of hybridization unless variability especially in flower color is considered such proof. The following quotation from Torrey and Gray's Flora of N. America (1: 382. 1840) expresses their reasons for treating the two as varieties: "Although Mr. Nuttall, who has had the opportunity of examining the two plants in a living state, still considers his *L. diffusus* as a distinct species, yet our numerous specimens exhibit a manifest gradation from the *L. diffusus*; Nutt. to the largest and most lanuginous states of *L. villosus*." My own experience with an even larger series of specimens and some field observations are in direct contradiction to their conclusion. The morphological variation, although considerable, appears to be anything but a gradual transition from one extreme to the other. I have never seen a specimen that was not at once referable to one taxon or the other. It would seem then that there must be some effective and probably genetical barrier separating them. Therefore, they are treated here as species. Phillips evaluated the differences as warranting only subspecific status and offered the following key to distinguish them:

Stems and petioles villous; free portions of stipules 2.5-5 cm long

..... 16a. ssp. *villosus*

Stem and petioles lanose; free portions of stipules .5-2 cm long

..... 16b. ssp. *diffusus*

3. LUPINUS VILLOSUS Willd., Sp. Pl. 3: 1029. 1803.

Perennating stems mostly 2-4 dm long, decumbent, much-branched, numerous, clustered, shaggy, long-villous, arising from a deep-seated, woody taproot. Stipules fused for about 0.5-2 cm to the petiole; the free portion linear, mostly 1.5-3(4) cm long, about 1 mm wide. Petiole stout, about 1-2 mm in diameter, mostly (4)6-12(15) cm long, densely shaggy-villous particularly on the petioles of the lowermost leaves with wide-spreading hairs about 3 mm long. Leaves 1-foliolate, mostly oblong or elliptic, obtuse to acute, apiculate, with broadly rounded or gradually tapering base and densely villous pubescent on both surfaces, mostly 6-10(15) cm long and 2-4(6) cm wide. Racemes erect, mostly 1.5-3 dm long, with densely, rusty to tawny, spreading-pubescent rachis and numerous, often subverticillately arranged flowers.



Fig. 30. *Lupinus diffusus*. (a) Distribution; (b) Habit sketch of flowering plant; (c) Fruit.

Pedicels about 1-4 mm long, densely pubescent, subtended by caducous, linear-subulate bracts about 8-12 mm long and hence usually equaling or exceeding the calyx in length. Calyx densely tawny or rusty pubescent, conspicuously 2-lipped, the tube about 4-5 mm long, the upper lip about 4 mm long, truncate or somewhat emarginate; the lower lip 3-lobed, the lateral lobes linear, about 2 mm long, the central lobe about 6-8 mm long. Petals basically flesh-colored to deep pink or roseate with the center of the standard rich reddish purple within. Legume about 3-4.5 cm long, shaggy, villous-pubescent with hairs 4-5 mm long.

DISTRIBUTION: Coastal Plain from North Carolina south into central Florida, and west into perhaps Louisiana. (Phillips, the most recent monographer of this group, maps this taxon no further west than Alabama.)

Nuttall described the second species of our simple-leaved lupines, calling it *L. diffusus*, without seeing either flower or fruit. Even so he was so impressed by seeing the plant thousands of times over an area of several hundred miles that he named it on the basis of vegetative material. The most reliable and usable character known to me still seems to be the lack of long shaggy pubescence on the petioles of Nuttall's species. These plants warrant considerable further attention throughout their range and growing season in an effort to correlate the variation known in the plants. Further study of the group has become even more necessary since Small has described two additional species which are, at the very least, very closely related to those already described. Phillips (1955, p. 201) treats the four simple-leaved species recognized by Small as one species which he treated as being composed of two subspecies.

12. *CYTISUS* L., Sp. Pl. 739. 1753; Gen. Pl. ed 5. 328. 1754.

Unarmed shrubs or rarely small trees with alternate, palmately 3-foliolate or 1-foliolate, deciduous or persistent leaves (rarely leafless) often on ribbed, green stems with either minute stipules or none. Flowers solitary or in axillary or terminal racemes with clustered, showy, papilionaceous flowers. Calyx campanulate, 2-lipped; the upper lip with 2 short teeth, the lower with 3. Petals

yellow, white or purple with ovate to orbicular standard. Wings clawed and bearing a basal auricle and a shallow lateral depression. Keel petals clawed and with a basal lobe and a pronounced lateral pouch. Stamens monadelphous, the filaments alternating long and short. Ovary sessile or rarely stalked. Legume compressed, much exerted from the calyx. Seeds several and bearing a glandlike, hardened appendage near the hilum.

A genus of about 75 species largely centered about the Mediterranean Basin. (Name derived from the Greek appellation of some plant thought probably to be a species of *Medicago*.)

1. *CYTISUS SCOPARIUS* (L.) Link, Enum. Hort. Berol. 2: 241. 1822.

Erect, bushy-branched shrubs about 1-2 m high with numerous, sharply angled, greenish, usually strongly ascendent stems, typically glabrous to sparsely short-pubescent when young. Stipules minute or more usually lacking. Leaves shortly petiolate below and becoming sessile or nearly so above; palmately 3-foliolate below, the leaflets obovate to elliptic, entire, usually moderately spreading short-pubescent, about 5-15 mm long; the upper leaves often 1-foliolate. Flowers large and showy, solitary or in pairs borne on slender pedicels about 1-1.5(2) cm long and with 1-several minute, spirally-arranged bractlets of less than 0.5 mm long and together forming long, terminal leafy raceme-like clusters. Calyx campanulate, glabrous and often somewhat glaucous, 2-lipped, the tube about 4 mm high, the upper lip about 2 mm higher with 2 minute teeth, the lower lip about 2.5 mm high with 3 minute teeth. Petals bright-yellow; standard suborbicular, 1.5-2.5 cm long with a claw about 3-5 mm long; the wings with a basal auricle and a shallow lateral depression; the keel petals with a basal lobe and a pronounced lateral pouch 1-3 mm deep. Filaments alternating long and short, the anthers all about 2 mm long but 5 basally attached and 5 versatile. Ovary bright green with silky pubescence along the sutures, short-stipitate (the stipe about 2 mm), the body about 8 mm long; style explosively recurving, about 2-2.5 cm long; stigma minute and knob-like. Legume broadly linear, densely villous along the sutures, about 4-5 cm long.

DISTRIBUTION: Native of Central and Southern Europe. Naturalized in the United States. The SCOTCH BROOM is commonly planted and spreads from cultivation.

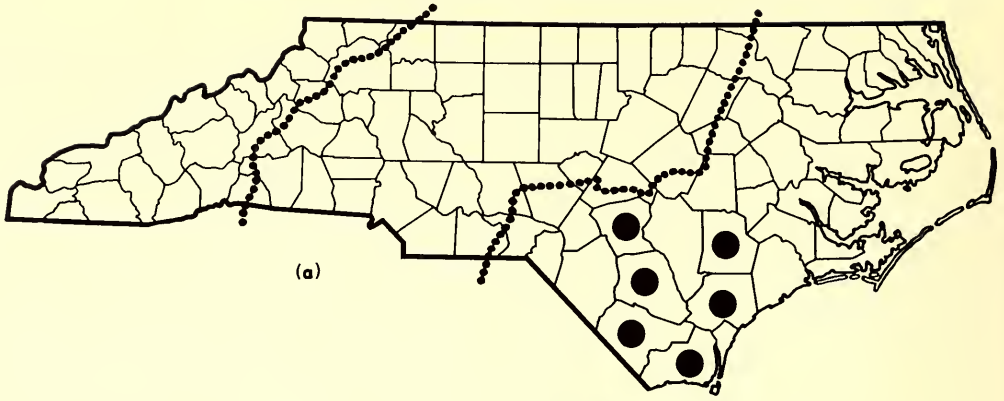


Fig. 31. *Lupinus villosus*. (a) Distribution; (b) Habit sketch of flowering plant; (c) Fruit.

13. *TRIFOLIUM* L., Sp. Pl. 764. 1753;
Gen. Pl. ed. 5. 337. 1754.

Annual, biennial or perennial herbs with usually annual, decumbent, ascendent or erect, aerial stems. Stipules conspicuous, persistent and usually adnate to the petiole. Leaves alternate, usually palmately or rarely pinnately 3-foliolate (occasionally with one or more extra leaflets, "four-leaf clovers", etc. or regularly 5-8-foliolate in *T. Lupinaster*) with rarely entire, but more typically denticulate or serrulate margins. Inflorescence axillary or terminal, sessile or peduncled heads, spikes or head-like racemes or umbels. Flowers sessile or pedicellate, naked or bracteate. Calyx persistent, the tube campanulate or cylindrical, 5-10 (20)-nerved, the lobes narrowly linear to triangular, equal to very unequal. Petals yellow, white or light to dark red, purple or bicolored, united below with the staminal tube (or all free in our yellow-flowered species or in some species the standard alone free and the wing and keel petals united), withering and persisting after anthesis. Stamens diadelphous with the uppermost free or monadelphous. Ovary sessile or stipitate. Legume often enclosed within the calyx-tube and typically enveloped by the persisting petals, obovoid to oblong-linear, usually membranous, indehiscent or opening by one suture, or more rarely circumscissile, 1-8 seeded.

A genus of about 300 species principally of the north temperate region centering about the Mediterranean Sea and with numerous species in Europe, Asia and Africa; in our hemisphere the native species mostly found in the Far West. (Name derived from the Latin *tres* = three and *folium* = leaf.)

1. Flowers sessile or subsessile (pedicels less than 0.5 mm long); petals never bright yellow.
2. Calyx-tube densely pubescent on one side, glabrous or nearly so on the other, the base asymmetrically swollen, in fruit becoming bladdery and greatly inflated 1. *T. resupinatum*.
2. Calyx glabrous or uniformly pubescent on both upper and lower sides, the base more or less symmetrical, in fruit not becoming bladdery or greatly inflated.
3. Heads on naked peduncles, not more or less involucrate by expanded stipules of two, closely subtending, opposite leaves; leaves all alternate.
4. Calyx-tube glabrous or very nearly so, conspicuously 20-nerved 2. *T. lappaceum*.

4. Calyx-tube densely villous, inconspicuously 10-nerved.

5. Petals about 4 mm long, white to pinkish, about 2 mm or so shorter than the calyx-lobes; leaflets 3-times or more longer than wide; heads appearing grayish from the densely villous calyx 3. *T. arvense*.
5. Petals about 8-12 mm long, usually bright red, usually about 2-5 mm longer than the calyx-lobes; leaflets about as wide as long or at least not more than twice as long; head appearing bright red from the petals, the calyx tawny-pubescent 4. *T. incarnatum*.
3. Heads sessile or very short-peduncled, closely involucrate from expanded stipules of two, closely subtending, opposite leaves; the median and lower leaves alternate.
6. Calyx-lobes 3 mm long or more and longer than the calyx-tube; petals exceeding the calyx-lobes by 2 mm or more; flowers more than 1 cm long.
7. Free portion of blade of stipule above the adnate base about as long as the bristle-like tip (or if shorter than, then at least half as long); perennial; calyx-tube 10-nerved; the lowermost calyx-lobe conspicuously longer than the lateral and upper lobes 5. *T. pratense*.
7. Free portion of blade of stipule above the adnate base several-times exceeded by the bristle-like tip; annual; calyx-tube 20-nerved; the calyx-lobes equal or nearly so 6. *T. hirtum*.
6. Calyx-lobes 2 mm long or less and shorter than the tube; petals equaling or but slightly exceeding the calyx-lobes in length; flowers less than 1 cm long 7. *T. striatum*.
1. Flowers distinctly pedicellate, elongating and recurving in fruit; petals bright yellow (in three species) or white, roseate, purplish, etc.
8. Stems creeping and rooting at the nodes; peduncles arising from the prostrate stems; calyx-tube inconspicuously 10-nerved 8. *T. repens*.
8. Stems erect or ascending, without basal runners; peduncles terminal or axillary from the upper cauline leaves; calyx-tube 5-10-nerved.
9. Leaves palmately compound, the terminal leaflet merely petiolulate like the laterals.
10. Petals white, reddish or purple and at least the wing and keel petals united to the staminal tube.

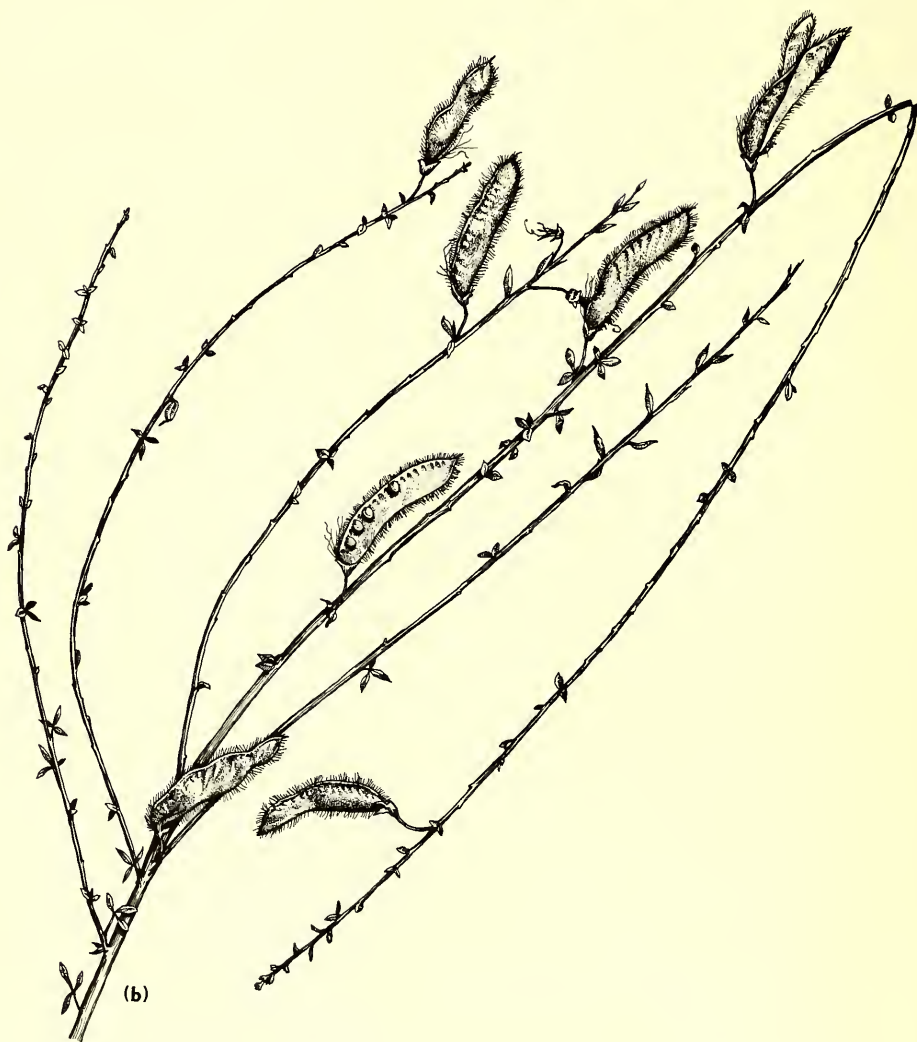
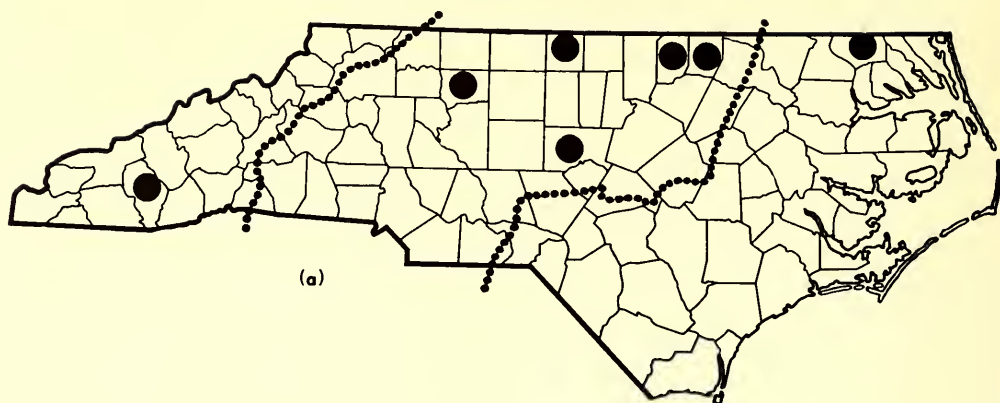


Fig. 32. *Cytisus scoparius*. (a) Distribution; (b) Habit sketch of fruiting branches.

11. Calyx-tube 5-nerved with lobes equaling or at least not more than 2-times as long as the tube; calyx-lobes 1-nerved 9. *T. hybridum*.
11. Calyx-tube 10-nerved with the longest lobe 2-times or more longer than the tube; calyx-lobes 3-nerved.
12. Flowers 8 mm long or more, calyx-tube 1.5 mm high or higher, the calyx-lobes 4 mm long or longer, wing-petals obtuse; standard usually red and decidedly of a darker color than the pink to white wing and keel-petals 10. *T. reflexum*.
12. Flowers 7 mm long or less, calyx-tube 1 mm high or less, the calyx-lobes 3 mm long or less, wing-petals acute; petals all purplish and more or less of the same hue 11. *T. carolinianum*.
10. Petals yellow and all free from the staminal tube 12. *T. agrarium*.
9. Leaves pinnately compound, the terminal leaflet on rachis-stalk 2-4 mm long and also petiolulate like the laterals.
13. Heads usually 20-40-flowered, the standard conspicuously striate-sulcate, flattened or at least not longitudinally folded, more than 2 mm wide 13. *T. campestre*.
13. Heads usually 3-15(20)-flowered, the standard not striate-sulcate, longitudinally folded and less than 2 mm wide 14. *T. dubium*.

1. TRIFOLIUM RESUPINATUM L., Sp. Pl. 771. 1753.

Annual or winter-annual (or perhaps biennial) herb with simple or branching root and decumbent to ascendent, often diffusely branched, commonly succulent and hollow, glabrous stems about 1-4 dm long. Stipules lanceolate to ovate-lanceolate, long-acuminate, membranous, colorless, about one-third to two-thirds their length adnate to the petiole, about 0.5-1.5 mm long. Petioles of the lower and median leaves elongate, about 4-8 cm long, those of the upper very short and usually exceeded in length by their stipules, about 3-5 mm long. Leaves palmately 3-foliolate, the leaflets with short petiolules about 0.5-1 mm long, mostly obovate to oblanceolate with cuneate base and broadly rounded, truncate or somewhat emarginate apex, more or less glabrous on both surfaces, mostly 1-2 cm long and 0.7-1 cm wide, the margins denticulate or serrulate for about two-thirds their length. Heads hemispherical and mostly about 0.5-1 cm wide at anthesis but soon becoming globose

and about 1.5-2 cm in diameter, on peduncles usually (at least in fruit) exceeding the subtending leaves and about 2-6 cm long, with about 6-18, closely associated flowers about 4-6 mm long, subsessile (pedicels 0.5 mm or less), subtended by a minute, collar-like, truncate, toothed involucre. Calyx strongly 2-lipped, the tube about 1.5-2 mm long, the lower (ie. outer in flower) side glabrous or nearly so, the upper (in flower inner) side densely pubescent, the three lower lobes narrowly lanceolate, about 0.6-0.8 mm long, the upper two subulate, about 1-1.5 mm long; the upper lip of the calyx much-inflated at maturity, about 6-10 mm long, bristle-tipped, forming a coarsely net-nerved, papery sac inverted at maturity. Petals roseate to purplish, about 4-6 mm long, basally twisted so that the standard appears lowermost, the standard conspicuously longer than the wing and keel petals. Legume oblong to ovoid, 1-2-seeded, completely enclosed within the bladdery calyx.

DISTRIBUTION: Native perhaps of Asia Minor but widespread now throughout the Mediterranean area. Locally established in the eastern United States.

2. TRIFOLIUM LAPPACEUM L., Sp. Pl. 768. 1753.

Annual herb from taproot 4-12 cm long with usually few to several, slender, glabrous or nearly so, spreading to erect, rarely decumbent stems (0.5)1.5-3.5(4) dm long. Stipules united to petiole below and there glabrous or nearly so, pale brownish to straw-colored with greenish or purplish veins, mostly about 6-12 mm long and nearly equaling their narrowly lanceolate, long-attenuated, externally densely long-hirsute, free tips. Petioles mostly 4-10 mm long above while below often 2-5 cm long and sparsely to densely hirsute with long, spreading trichomes. Leaves palmately 3-foliolate; leaflets very short-petiolulate (the petiolules mostly about 1.2 mm long or less), obovate to somewhat spatulate, conspicuously cuneate, mostly (0.5)1.2-2(2.5) cm long, broadly rounded to truncate or emarginate at apex, conspicuously but finely denticulate along the upper third of the margin, spreading long-villous on both surfaces. Heads terminal, solitary, globose to somewhat ovoid, at first about 1 cm in diameter but enlarging in fruit to about 2.2 cm borne on an appressed-pubescent peduncle about 5-10 mm long elongating and glabrate at maturity and then about 2-4 cm long with numerous compactly clustered, sessile, bractless flowers about 6-9 mm long. Calyx-tube glabrous, cylindrical to campanulate, very coarsely ribbed with 20 elevated nerves, about

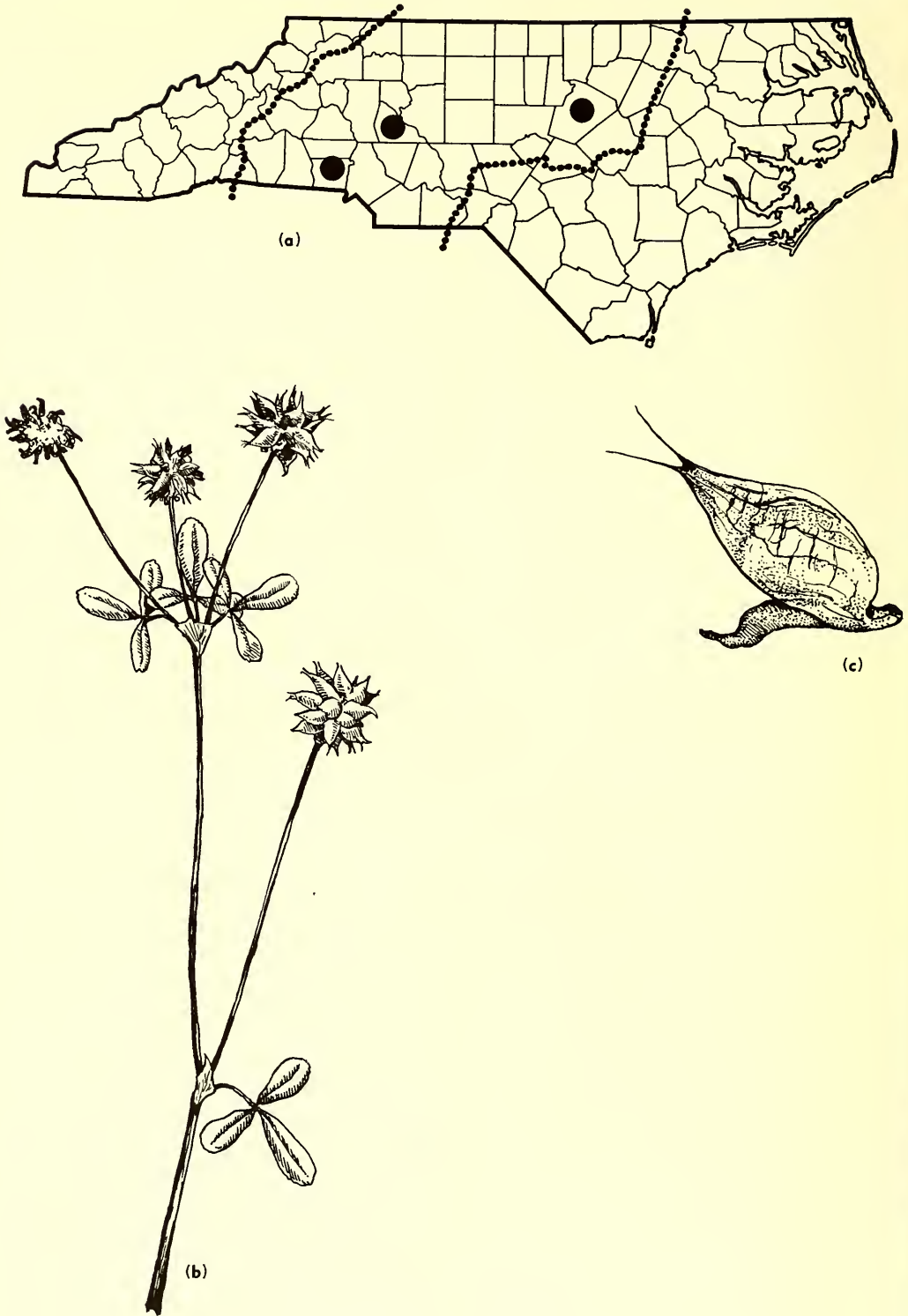


Fig. 33. *Trifolium resupinatum*. (a) Distribution; (b) Habit sketch; (c) Fruiting calyx.

2.2 mm long in flower and about 3 mm long in fruit with a ring of abundant white, stiff hairs about 1 mm long; calyx-lobes equal or nearly so, stiff, subulate with long tapering tip, 5-nerved at base, about 5-7 mm long and with wide-spreading trichomes on the arching, tapering tip. Petals reddish-white, usually slightly exceeding to somewhat shorter than the calyx-lobes, drying reddish-brown. Legume ovoid, pale yellowish-brown, seed ovoid, smooth, pale reddish-brown.

DISTRIBUTION: Native to the region about the Mediterranean. This plant has been found but once in North Carolina and that in a weedy railroad yard in Hallsboro, Columbus Co. (*Bell 12817 UNC*).

3. *TRIFOLIUM ARVENSE* L., Sp. Pl. 769. 1753.

Annual with taproot and erect, ascending or spreading stems about (0.5)1.3(4.5) dm high, simple or more typically freely branching and appressed-pubescent to spreading short-villous. Lower stipules lanceolate with setaceous, subulate apex, those of the upper leaves with elongate setaceous tip often exceeding the petiole from an ovate to oblong base adnate to the petiole and mostly 4-10 mm long. Petioles slender, those of some of the lower and primary leaves elongate, about 2-3(4) cm long and then as long or longer than the leaflets, those of most of the median and upper leaves shorter than the leaflets, about 3-10 mm long. Leaves palmately 3-foliolate, leaflets short-petiolulate, linear-lanceolate, linear-oblong or oblanceolate, with a cuneate base, mostly 1-2.5 cm long and 2-6(10) mm wide, entire or minutely toothed near the apex, acute, truncate or emarginate, densely appressed short-villous on both surfaces. Heads usually grayish, often numerous, axillary or terminal, somewhat globose to obovoid or becoming oblong or cylindrical, mostly 1-3(4) cm long and 8-15 mm in diameter on peduncles about 1-3 cm long with numerous, densely clustered, sessile, bractless flowers about 7 mm long or less. Calyx grayish, densely villous with spreading hairs (up to 2 mm long); tube campanulate to cylindrical, about 2 mm long, light green, 10-nerved; lobes setaceous, wide-spreading, about 3-5 mm long, almost equal, often reddish, conspicuously plumose. Petals about 4 mm long, usually exceeded by the calyx-lobes by about 2 mm and hidden by the calyx-pubescence, pale rose or pinkish to white. Legume broadly ovoid, entirely enclosed within the calyx-tube, 1-2-seeded, scarcely dehiscent.

DISTRIBUTION: Native of Eurasia and North Africa but now widespread. The

RABBIT-FOOT CLOVER is naturalized throughout much of the United States.

4. *TRIFOLIUM INCARNATUM* L., Sp. Pl. 769. 1753.

Annual (or reportedly winter annual or even biennial) from taproot, often branching at the base with stems spreading, ascending or erect, branching or rarely simple, mostly 2-4(8) dm high and more or less densely covered with appressed pubescence or more usually with spreading, pilose trichomes. Stipules large, mostly 1-2 cm long, membranous, mostly adnate to the petiole, the free portion broadly ovate, obtuse, shallowly erose to toothed and frequently purplish tipped. Petioles of the lower and some median leaves elongate, commonly 5-20 cm long, those of the upper leaves shorter, often 0.5-3 cm long, usually densely pubescent with appressed or more commonly spreading hairs. Leaves palmately 3-foliolate, the leaflets very short-petiolulate, [the petiolules about 0.5-1 mm long], broadly obovate and somewhat cuneate to almost orbicular, apex broadly rounded, truncate or emarginate, mostly 1-3(4) cm long and nearly as wide, upper half shallowly erose to slightly toothed, softly pubescent. Heads terminal, solitary, ovoid to cylindrical, about 2-7 cm long and 1-2.5 cm in diameter on usually elongate, somewhat nodding peduncles about 4-12 cm long, with numerous, densely clustered, sessile bractless flowers about 8-12 mm long. Calyx densely tawny villous, tube cylindrical to campanulate, about 3.5-5 mm long, 10-nerved, the lobes linear-subulate, about 4.5-7 mm long, equaling or longer than the tube, almost equal, at first erect but later wide-spreading. Petals about 0.8-1.2 cm long, the standard much longer than the wing and keel petals, usually about 2-5 mm longer than the calyx-lobes, scarlet, deep red or rarely white. Legume sessile, ovoid, 1-seeded, enclosed within the calyx-tube.

DISTRIBUTION: The CRIMSON CLOVER is a native of the Mediterranean area but is often cultivated and commonly escapes throughout much of the United States.

5. *TRIFOLIUM PRATENSE* L., Sp. Pl. 768. 1753.

Perennial (or sometimes biennial) herb from strongly developed taproot and with usually numerous stems arising from the basal rosette, decumbent to erect, simple or short-branched, mostly 2-5(7) dm high, rarely glabrous or more commonly pilose to densely



Fig. 34. *Trifolium arvense*. (a) Distribution; (b) Habit sketch; (c) Fruiting head; (d) Fruiting calyx.

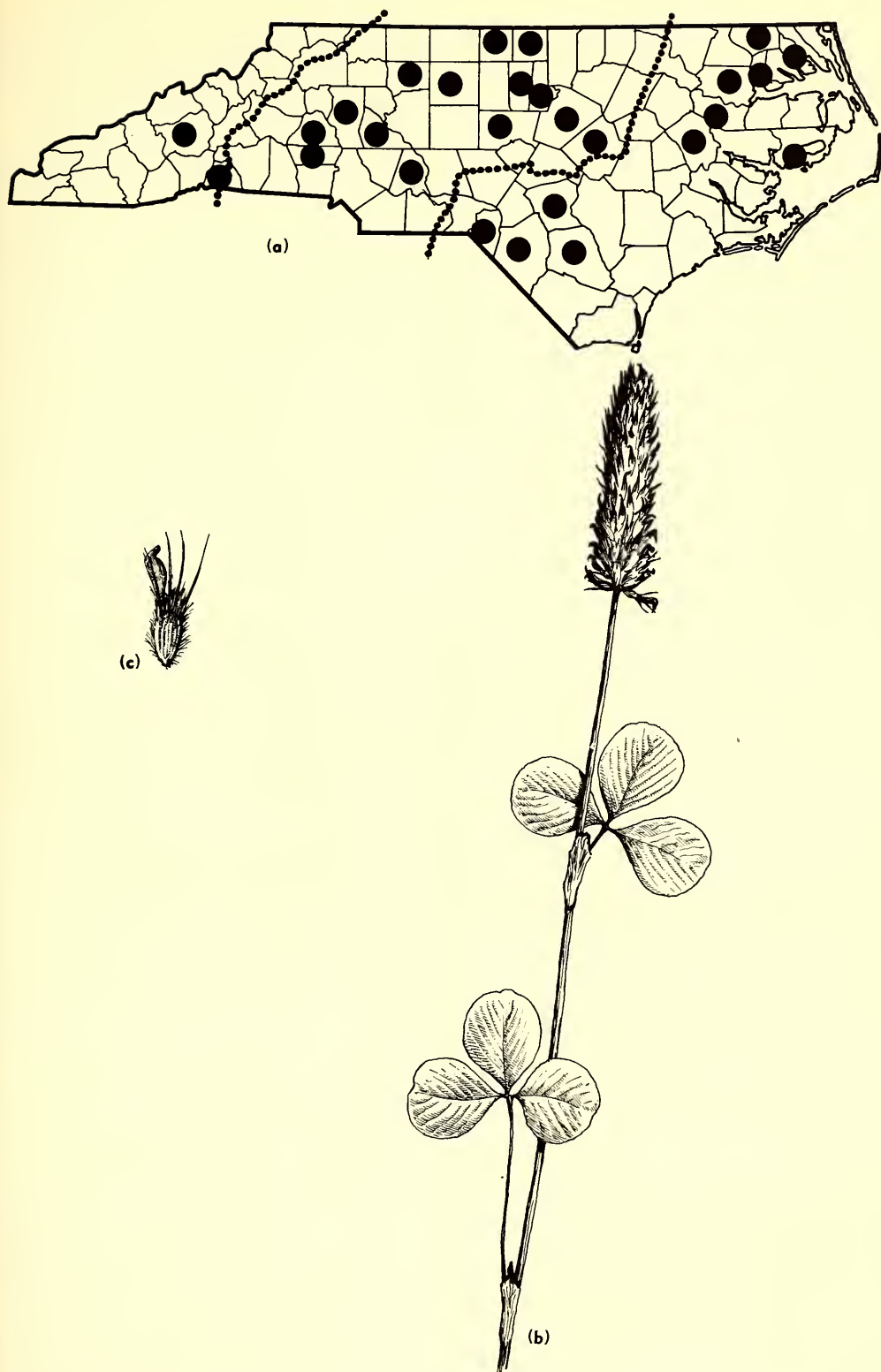


Fig. 35. *Tritolium incarnatum*. (a) Distribution, (b) habit sketch; (c) Calyx.

villous. Stipules oblong to ovate-lanceolate, mostly 1-3 cm long, three-fourths of length or more adnate to the petiole, the free portion broadly triangular and abruptly tapering into a setaceous tip about 4-8 mm long, membranous, and usually with conspicuous dark green or red, reticulate venation. Petioles of the basal rosette commonly 1-2.5 dm long, those of the lower stem leaves often 6-15 cm long, those of the upper leaves often 1-1.5 cm long or but little longer than the stipules. Leaves palmately 3-foliolate; leaflets short-petiolulate (about 1-1.5 mm long), oval, elliptic or cuneate-obovate, mostly 1-3(5) cm long and about half as wide, almost entire, pubescent on both sides or glabrous above, the margin usually ciliate, usually bright green above or commonly with light green or dark reddish spots or transverse lines, below paler green or occasionally somewhat glaucous. Heads mostly terminal, sub-globose to ovoid, about 1-3 cm long and about (1)2(3) cm in diameter, sessile or very short-pedunculate, usually closely subtended by the broad stipules of the 2 upper, often reduced leaves, or rarely with peduncles up to 0.5 cm long, with numerous (usually 30-90), closely clustered, erect, sessile (or pedicels 0.2 mm long or less) bractless flowers about 1.2-1.8 cm long. Calyx-tube campanulate, narrowed at base, 10-nerved, about 3-4 mm long, hyaline; tawny or rufous pubescent (externally as well as in the throat); the lobes subulate from a triangular base, sparsely pilose, the upper and lateral lobes mostly 3-4 mm long, the lowermost about 5-6 mm long. Petals reddish to reddish-purple (rarely white), 1.2-1.8 cm long with the standard longer than the wing or keel petals. Legume ovoid-oblong, about 3 mm long and 2 mm wide, circumscissile, the upper part smooth, the lower wrinkled, 1-seeded.

DISTRIBUTION: Native of Eurasia and North Africa. Widely naturalized throughout temperate North America. Numerous varieties have been recognized by European botanists.

Fernald (*Rhodora* 45: 331. 1943) pointed out that *T. pratense* var. *pratense* is a much less frequently encountered plant than var. *sativum*, the commonly cultivated RED CLOVER.

He distinguished them as follows:

Var. *pratense*. Short-lived perennial, with glabrous or sparingly pilose stems 0.5-4 dm high; larger leaflets 1-3 cm long and 0.5-1.5 cm broad; heads 1.3-3 cm long.

Var. *sativum* (Mill.) Schreb. Coarser and longer-lived, with stems 3-8 dm high; larger leaflets 3-7 cm long and 1.5-3.5 cm broad; heads 3-4 cm long.

Although Hermann (1953, p. 35) maintained them as distinct, no effort was made in this study to differentiate between the representatives in our collections.

6. TRIFOLIUM HIRTUM All., Fl. Péd. 20. 1789.

Annual herb from well-developed taproot with usually several to numerous, spreading, white-villous stems about 1-4 dm long ascending from the base. Stipules villous, united to each other and to the petiole below and appearing ovate-oblong and pale-membranous, with usually dark-greenish to reddish-purple veins and with the upper free portion mostly composed of the abruptly contracted, setaceous tip of about (3)5-8(10) mm long, equaling the base or nearly so and exceeding the free portion of the blade. Petioles densely short-, spreading-, white-villous and those of the median and upper stem mostly 1-4 cm long, the lowermost sometimes longer and the very uppermost often nearly sessile. Leaves palmately 3-foliolate; leaflets very short-petiolulate (mostly 0.5-1.2 mm long), obovate to somewhat spatulate, conspicuously cuneate, mostly 0.8-2 cm long, minutely toothed, villous above and below. Heads terminal, solitary, globose or nearly so, about 1.5-2.5 cm in diameter, closely subtended by the expanded stipules of the 2 uppermost, nearly opposite, often reduced leaves with numerous, compactly clustered, sessile, bractless flowers about 1.2-1.5 cm long. Calyx densely villous internally above and externally throughout; the tube obconic and about 2.5-3.5 mm long, 20-nerved; the lobes equal or nearly so, setaceous, about 4.5-6.5 mm long. Petals reddish-purple, about 0.9-1.2 cm long with the slender standard exceeding the wing- and keel-petals and also the calyx-lobes by 3-5 mm. Legume ovoid to almost globose, 2-valved.

DISTRIBUTION: Native of the Mediterranean Region and southern Europe; established locally in southeastern Virginia and collected once in Orange County, N. C. along a roadside.

7. TRIFOLIUM STRIATUM L., Sp. Pl. 770. 1753.

Annual (or perhaps biennial) herb with slender, fibrous roots and single or more commonly tufted, decumbent, ascending or rarely erect, densely pubescent stems about 1-3(6) dm long. Stipules oblong to ovate-lanceolate, acuminate, mostly 5-8 mm long, membranous with greenish or reddish veins. Petioles of the lower and median leaves often elongate and 4-8 cm long, those of the upper leaves short, little exceeding the adnate stipule in length, about 0.5-1 cm long. Leaves palmately 3-foliolate, the leaflets with very short peti-

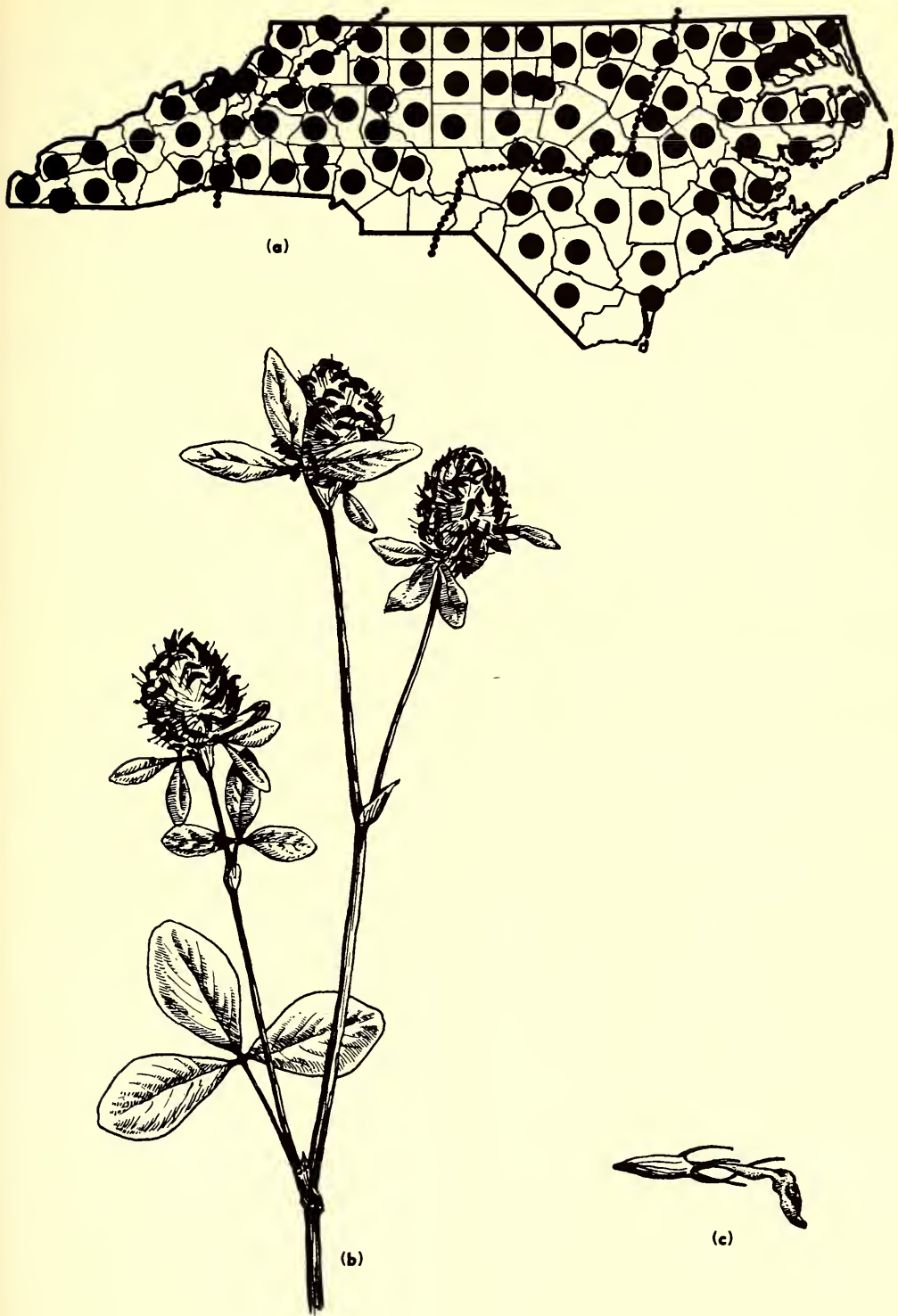


Fig. 36. *Trifolium pratense*. (a) Distribution; (b) Habit sketch; (c) Colyx showing withering petals.

olules or apparently sessile, obovate to oblong, cuneate, broadly obtuse, truncate or emarginate, slightly apiculate, denticulate for about the upper half of the margin, 0.7-3 cm long and about 4-12 mm wide, densely short-pilose on both surfaces. Heads axillary or terminal, solitary or paired, ovoid to oblong but becoming cylindrical, about 8-15 mm long and about 8-12 mm thick, sessile or nearly so and appearing involucre from the closely subtended dilated stipules of two opposite leaves, with compactly clustered, sessile, bractless flowers about 4-6 mm long. Calyx densely tawny-villous, the tube urceolate to ovoid, becoming slightly inflated at maturity, about 2.5-3.5 mm long, strongly 10-ribbed; the lobes lanceolate-subulate, unequal, about 0.8-2 mm long, the lowest lobe the longest, the uppermost shortest. Petals roseate, about equaling the calyx-lobes or very slightly exceeding them. Legume obovate, completely enclosed in the calyx-tube, about 2 mm long.

DISTRIBUTION: Mediterranean Eurasia and Africa; becoming established in widely scattered areas of the eastern United States.

8. TRIFOLIUM REPENS L., Sp. Pl. 767. 1753.

Perennial herb from well-developed taproot with creeping stems mostly 1-3(4) dm long, rooting at least at some of the nodes, with only the tip ascendent, almost glabrous or the tips sometimes sparsely short-pubescent. Stipules oblong to lanceolate, mostly about 8-15 mm long, abruptly tapering into a setaceous tip, pale whitish-green except for the dark green to reddish-violet veins, membranous, united into a sheath. Petioles elongate, angled, glabrous, mostly 5-20 cm long. Leaves palmately 3-foliate, leaflets with petiolules 1 mm long or less, broadly elliptic-obovate to cuneate-obcordate, broadly rounded to truncate or emarginate, mostly 1-2(3) cm long and about 8-25 mm wide, denticulate above, serrulate below, both surfaces glabrous. Heads globose or nearly so, about (1)1.5-2(3) cm in diameter, on peduncles often 1-2.5 dm long and usually equaling or longer than the subtending leaf, axillary from the repent stem, with about 40-80, more or less loosely arranged flowers about (6)8-10(12) mm long on pedicels at first about 1-1.5 mm long and often sparsely puberulent, later elongating and recurving and becoming about 3-5 mm long, the central longer than the lateral, subtended by scarious, hyaline, triangular-ovate or oblong bracts about 0.5-2 mm long, obtuse to acute. Calyx-tube about 2-3 mm long, campanulate or cylindrical, glabrous or very

sparsely puberulent, 10-nerved, more or less colorless except for the green nerves; the lobes narrowly lanceolate or triangular, acuminate, 1-nerved, with a membranous margin below, the uppermost about 3 mm long, the lowermost and the laterals about 2 mm long. Petals white (or occasionally tinged with pink) turning brown, about (6)8-10(12) mm long, the standard conspicuously longer than the wings. Legume oblong-linear, exceeding the calyx-tube, usually 4-5 mm long, 3-4-seeded.

DISTRIBUTION: Native of Eurasia but now found in almost all temperate and subtropical areas; widespread throughout most of North America.

LADINO CLOVER (*T. repens* f. *giganteum* Lagr.-Foss.) is included within the above description. It is one of the more important of the numerous agronomic strains of the WHITE CLOVER. It is a larger and much coarser plant than the typical plant with heads up to 3 cm in diameter and flowers up to 1 cm long.

9. TRIFOLIUM HYBRIDUM L., Sp. Pl. 766. 1753.

Perennial, often somewhat caespitose herb with an usually well-developed taproot and numerous erect to ascendent stems arising from the crown, branchless or with few, short branches, glabrous or sparsely short-puberulent above, about 1.5-6(8) dm long, usually hollow. Stipules oblong-lanceolate to ovate-lanceolate, tapering to an attenuate tip, adnate to the petiole for about 1/3 to 1/2 their length, mostly 1-2(3) cm long. Petioles slender, glabrous, long-petiolate below, about 5-10(15) cm long, the uppermost leaves often short-petiolate, commonly 1-3 cm long. Leaves palmately 3-foliate, short-petiolulate (the petiolules about 1 mm long), ovate to oval or cuneate-obovate, broadly obtuse to emarginate, about 1.5-4(6) cm long and 1-2.5(3.5) cm wide, denticulate above, serrulate below, with both surfaces glabrous. Heads globose or nearly so, about 1.5-2.5(3.5) cm in diameter, axillary, on peduncles usually equaling or exceeding the subtending leaf, mostly 2-8(12) cm long with numerous (30-50), closely associated flowers about 6-11 mm long. Pedicels about 0.5-2 mm long at anthesis, elongating and at maturity up to 5-7 mm long, unequal, the central 2 or more times as long as the lateral, becoming strongly recurved at maturity, commonly sparsely puberulent. Calyx-tube campanulate, about 1.5-2.2 cm long, glabrous or very sparingly puberulent, more or less colorless, 5-nerved;

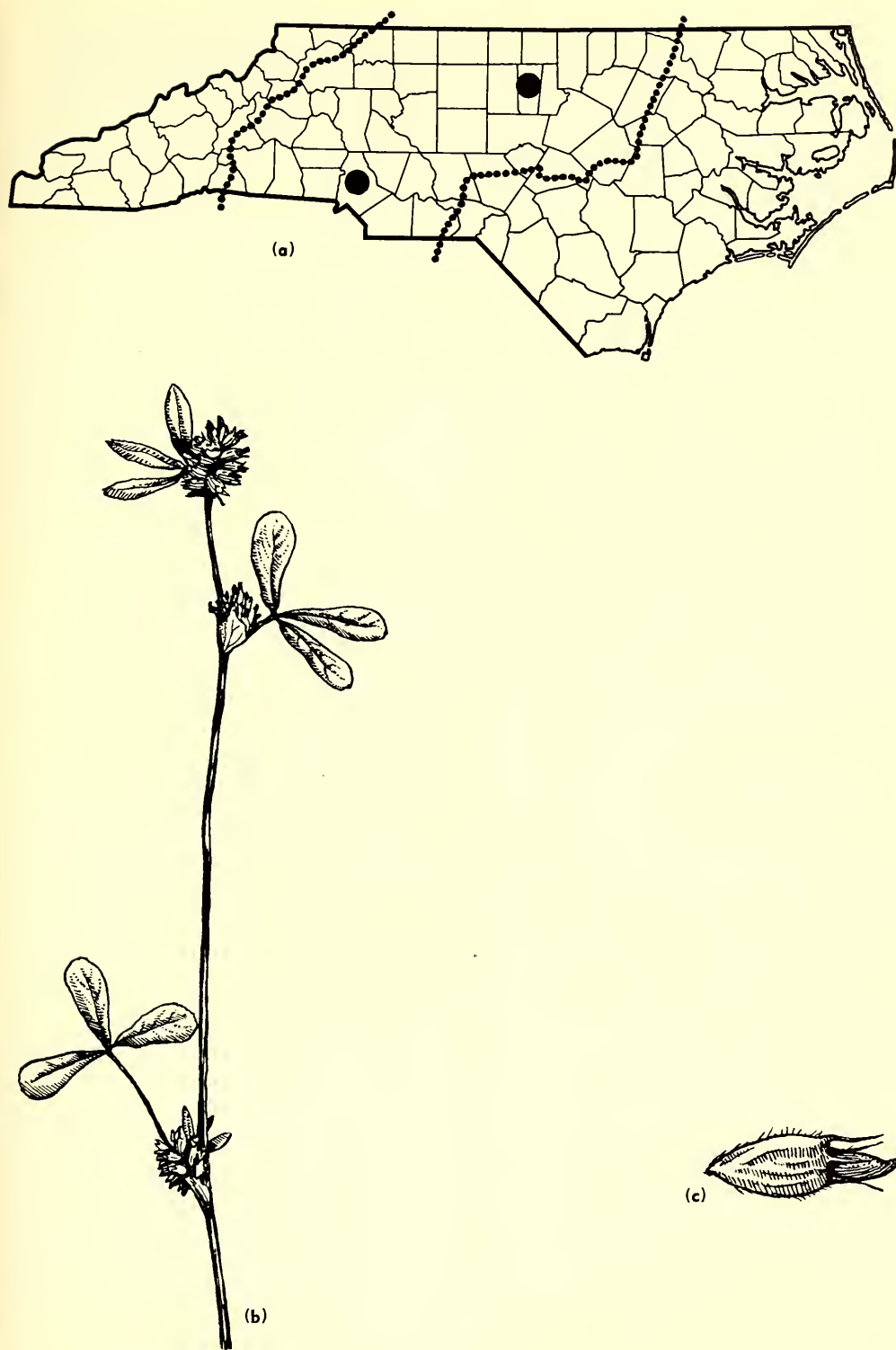


Fig. 37. *Trifalium striatum*. (a) Distribution; (b) Habit sketch; (c) Fruiting calyx.



Fig. 38. *Trifolium repens*. (a) Distribution; (b) Habit sketch; (c) Enlarged flower.

the lobes linear-subulate, about 1.5-2.5 mm long, slightly unequal, the upper exceeding the lower and lateral lobes. Petals about 6-11 mm long, the standard usually 2-3 mm longer than the wing and keel petals, mostly dirty white, first turning roseate and after flowering brownish. Legumes linear-oblong, thin-walled, 2-4-seeded, about 3-4 mm long, exserted from the calyx-tube.

DISTRIBUTION: Native of Europe but widely cultivated and now naturalized throughout much of North America.

Both Fernald (*Rhodora* 45: 331. 1941) and Hermann (1953, p. 20) consider the cultivated plant as the typical variety, *T. hybridum* var. *hybridum*. The more frequently escaped variety is *T. hybridum* var. *pratense* Rabenh. (= *T. hybridum* var. *elegans* (Savi) Boiss.). Fernald distinguished them as follows:

Var. *hybridum*: Stems 3-8 dm high; the larger leaflets 2.5-6 cm long and 2-3.5 cm broad; the heads very dense and 2-3.5 cm in diameter with the individual flowers 8-11 mm long.

Var. *pratense*: Stems 1.5-6 dm high; the larger leaflets 1.5-3.5 cm long and 1.2-5 cm broad; the heads less compact and 1.5-2.5 cm in diameter with the individual flowers only 6-8 mm long.

No effort was made in this study to determine the varietal identities of our representatives of ALSIKE CLOVER.

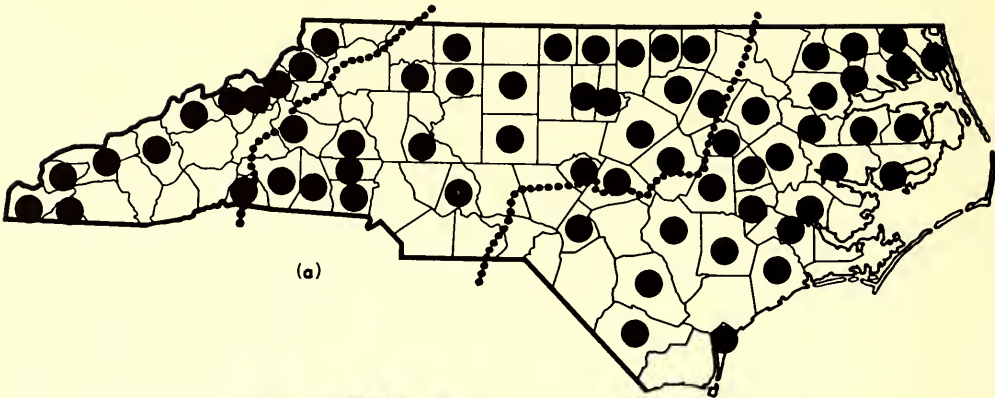
10. TRIFOLIUM REFLEXUM L., Sp. Pl. 766. 1753.

Annual or biennial herb lacking stolons but with clustered stems, ascending to erect, branching at the base, usually 2-5 dm long, villous to almost glabrous. Stipules lanceolate to ovate, tapering to an acuminate tip, mostly 1-2(2.5) cm long and 5-10 mm wide, adnate to the petiole for about one-fourth their length, entire or somewhat dentate. Petioles of the lower and often of the median leaves elongate, mostly 5-10(15) cm long, those of the upper leaves shorter, often 0.5-2 cm long, short-villous to glabrous. Leaves palmately 3-foliate, leaflets with petiolules about 0.5-1

mm long, ovate, oval, elliptic, oblong or cuneate-obovate, with margins serrate for about two-thirds their length, entire below, acute to obtuse, truncate or emarginate, mostly 1-3.5 cm long, 2-3-times longer than broad to even almost as broad as long, usually finely pubescent on both surfaces. Heads globose, about 2-4.5 cm in diameter, on erect, usually pubescent peduncles about 2-8(10) cm long, usually equaling or exceeding the subtending leaves, axillary, with numerous, densely clustered flowers about 8-10(12) mm long on usually densely pubescent pedicels of about 2-5 mm long at anthesis but later elongating and becoming recurved and then up to 10 mm long, appearing bractless or subtended by a minute, truncate, oblong, hyaline scale about 0.5 mm long or less. Calyx short-pubescent to nearly glabrous, the tube broadly campanulate or cup-like, about 1.5-2 mm high, 10-nerved, more or less scarious; the lobes linear-subulate, mostly about 4-6 mm long, the uppermost slightly longer (often about 1 mm longer), 3-nerved, sometimes conspicuously so although the laterals are often almost obscure and then almost appearing 1-nerved. Petals 8-10(12) mm long, the standard red or roseate and exceeding the white to pinkish wing and keel; petals all persisting and becoming brown. Legume oblong, 4-6 mm long on a stipitate base of about 1.5 mm long, commonly 4-seeded, with membranous walls and thickened sutures.

DISTRIBUTION: Western New York to eastern South Dakota and south into Texas and Florida.

A more or less glabrous race of the BUFFALO CLOVER has been recognized as a variety or form but the distribution of this extreme is apparently confined to the Mississippi Valley where the pubescent form also occurs. Isely (*Iowa State Coll. Jour. Sci.* 25: 475. 1951) reports upon a rather detailed study of the distribution of pubescence in more than 200 specimens. He divided the pubescence type into five classes ranging from calyx and stem closely pubescent to entirely glabrous. He found that there was no correlation between geography and any of the recognized pubescence types. Isely there provided a new combination as a form for the plant most frequently referred to as *T. reflexum* var. *glabrum* Lojac.



(a)



(b)



(c)

Fig. 39. *Trifolium hybridum*. (a) Distribution; (b) Habit sketch; (c) Enlarged flowers.

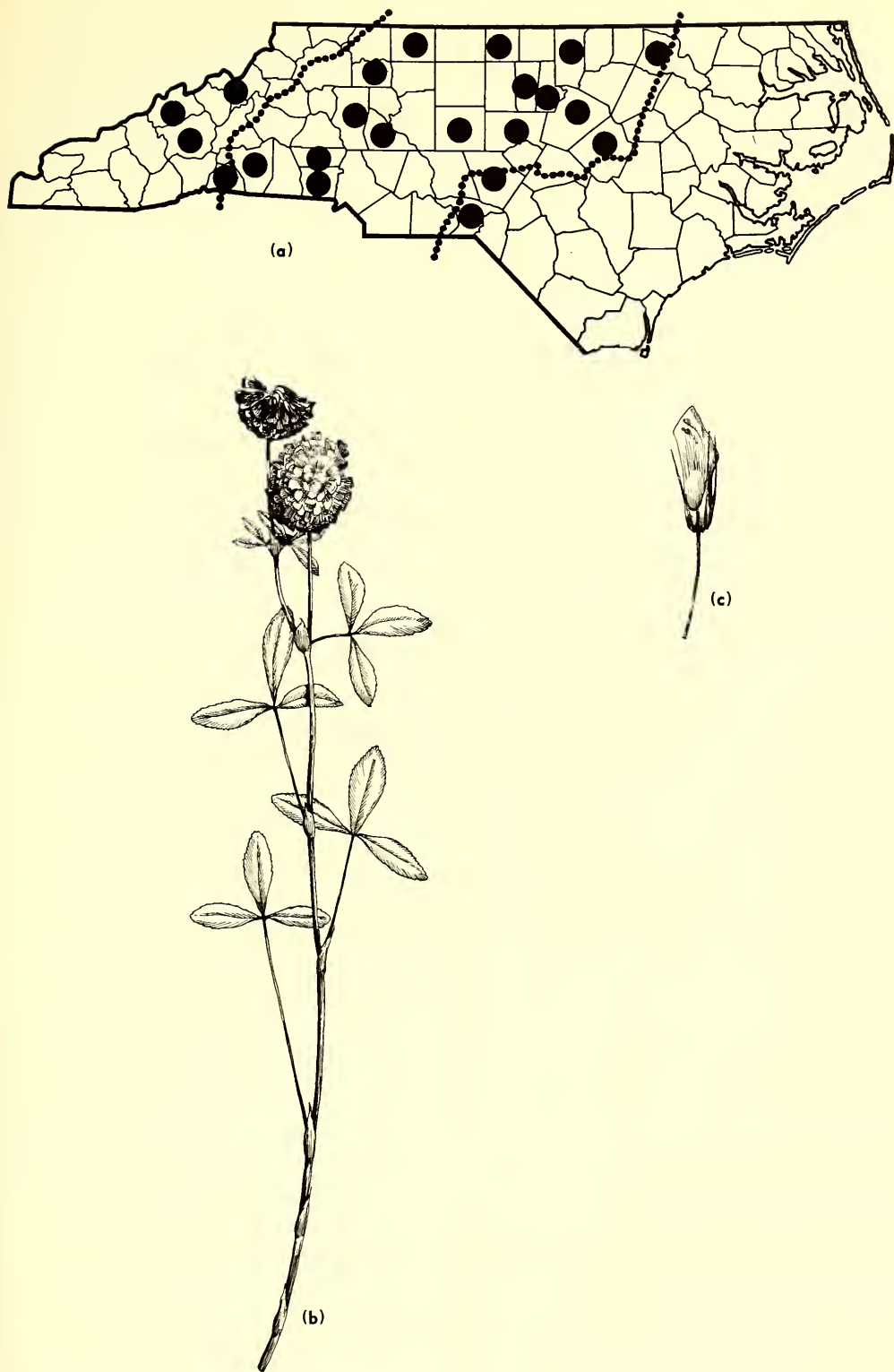


Fig. 40. *Trifolium reflexum*. (a) Distribution; (b) Habit sketch; (c) Enlarged flower.

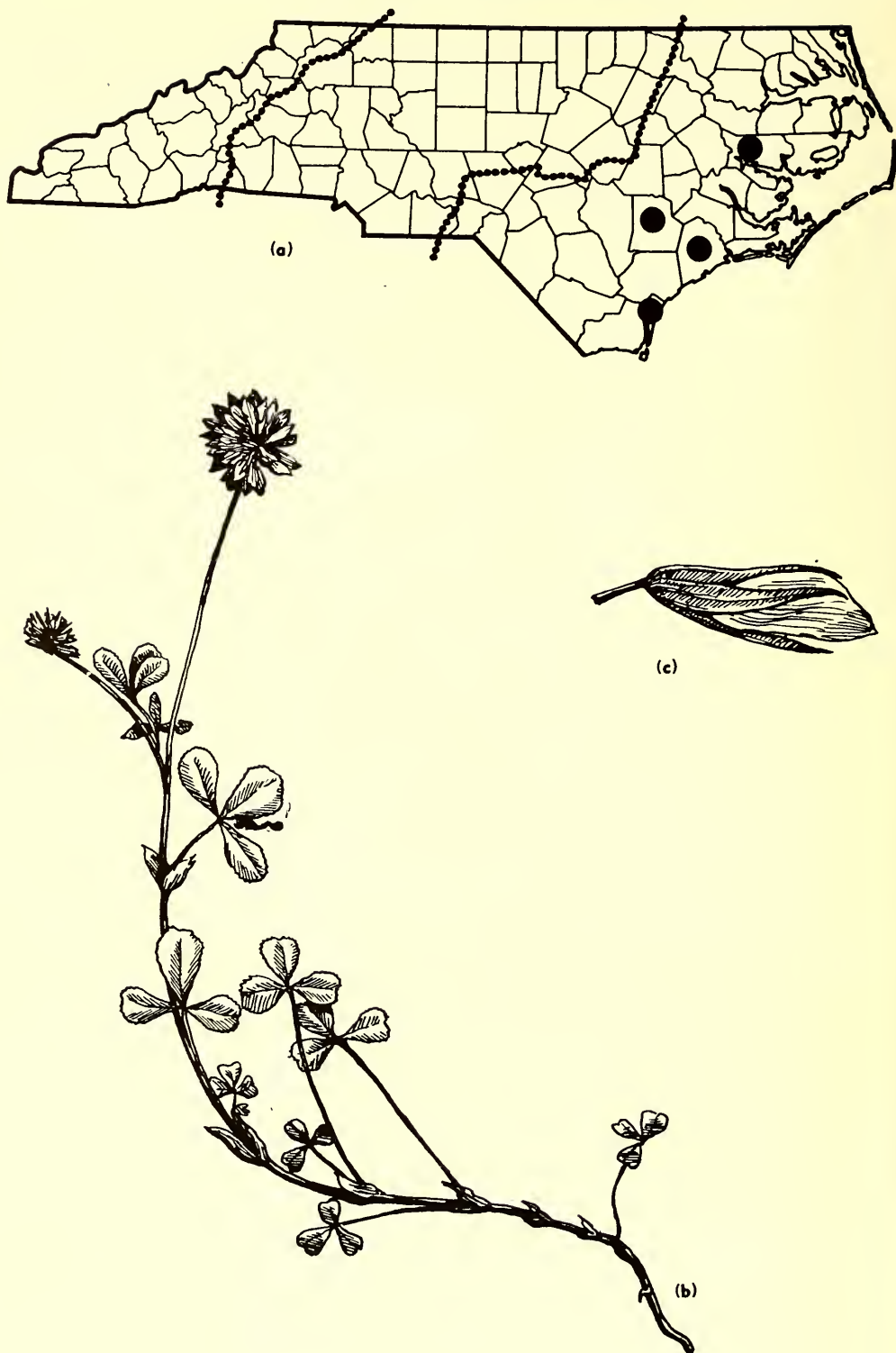


Fig. 41. *Trifolium carolinianum*. (a) Distribution; (b) Habit sketch; (c) Enlarged flower.

11. *TRIFOLIUM CAROLINIANUM* Michx.,
Fl. Bor. Am. 2: 58. 1803.

Perennial with slender roots and decumbent, ascendent or erect stems mostly 1-3 dm long, single or tufted and branched from the base and but little branched above, more or less appressed-pubescent throughout. Stipules ovate to ovate-lanceolate, acute to acuminate, adnate for about one-third to one-half their length to the petiole, mostly 4-8(10) mm long, more or less clasping the stem, usually sparsely toothed, appressed-pubescent, conspicuously nerved. Petioles commonly about 1-5 cm long, slender. Leaves palmately 3-foliolate, the leaflets all with short petiolules about 0.5-1 mm long, obovate to obcordate with a cuneate base and an usually truncate or emarginate apex, denticulate above the middle, about 4-10(15) mm long and 3-10 mm wide, sparsely pubescent to glabrous. Heads globose or depressed-globose, about 1-1.5 cm in diameter on slender, elongate peduncles mostly 3-10(12) cm long, with more or less loosely clustered flowers about 4-6 mm long on appressed-pubescent pedicels at anthesis mostly 1-3 mm long but elongating and recurving in fruit and then about 3-4 mm long, subtended by a collar-like scale with a purplish erose tip and about 0.5 mm high encircling the axis. Calyx short-villous, often purplish-tinged, the tube short-campanulate, about 0.8-1 mm high, 10-nerved, the lobes 3-nerved, triangular-lanceolate, unequal, the upper and longest about 2-3 mm long and the shorter about 1-1.5 mm long. Petals purplish, about 5-7 mm long, the standard broadly obovate, minutely erose and apiculate, wings acute. Legume oblong, 2.5-3.5 mm long, exserted from the calyx-tube, very short-stipitate, 2-4-seeded.

DISTRIBUTION: North Carolina south to Florida and west into Texas (and probably into Mexico) and north to southwestern Missouri and southeastern Kansas.

This species was thought by McVaugh (Ecol. Monog. 13: 143. 1943) to be perhaps one whose present range could be attributed to radial spread from the flat, granitic outcrops often found at or near the boundary between the coastal plain and piedmont provinces of the Southeastern States.

12. *TRIFOLIUM AGRARIUM* L., Sp. Pl. 772. 1753.

Annual or biennial herb with slender, much-branched roots and several, usually erect to ascendent stems arising from the base for

1-4.5 dm, usually branching above, appressed-pubescent or glabrate. Stipules linear-lanceolate, adnate for about half to two-thirds their length to the petiole, mostly 8-15(20) mm long, acute, those of the upper leaves usually exceeding the petiole. Petioles slender, short, mostly 5-12 (20) mm long. Leaves palmately 3-foliolate, leaflets with short petiolules about 0.2-0.6 mm long and all appearing equally stalked, somewhat rhombic, oblanceolate or oblong-obovate, mostly about 1-2(2.5) cm long and 4-8(10) mm wide, with a broadly rounded, truncate to emarginate apex and a more or less cuneate base, denticulate above the middle, sparsely pubescent to glabrous. Heads short-cylindric to ovoid, mostly 1-1.5(2) cm long and about 1-1.5 cm thick on stout, erect peduncles about 1-4 cm long and usually exceeding in length the subtending leaves, with numerous, closely clustered flowers about 5-7 mm long on pedicels about 0.3-0.8 mm long (which become reflexed after anthesis) and subtended by minute, hair-like bract (appearing naked without magnification of about 20x). Calyx glabrous, the tube campanulate, 5-nerved, about 0.8-1 mm long, the lobes linear, very unequal, the lower about 1.8-2 mm long, the upper two about 0.8-1 mm long. Petals bright yellow at anthesis; the standard about 4-5 mm long; its margin usually serrate and emarginate, turning brown and becoming striate-sulcate in age and then enlarging up to 7 mm long; the standard noticeably longer than wing or keel petals, usually about 1/3 longer. Legume oblong, exserted from calyx-tube on a stipe about 1-1.5 mm long, about 3.5 mm long including the stipe, 1-seeded; style about 1 mm long.

DISTRIBUTION: Native of Europe and western Asia; naturalized in North America reportedly ranging from Newfoundland to British Columbia south to South Carolina and Arkansas.

This HOP CLOVER may be readily distinguished from our other two hop clovers since it lacks a rachis-stalk.

13. *TRIFOLIUM CAMPESTRE* Schreb. in Sturm's Deutschl. Fl. 16. pl. 13. 1804.

T. procumbens in the sense of L., Fl. Suec., ed. 2, 261. 1755 and most American authors, but not of L., Sp. Pl. 772. 1753.

Annual (or biennial) herb with slender, much-branched roots and several to numerous, procumbent or more commonly ascending to erect stems, often with short branches, usually densely appressed short-pubescent at least above or sometimes becoming glabrate, mostly (0.6) 1-3(4) dm high. Stipules ovate to ovate-



Fig. 42. *Trifolium agrarium*. (a) Distribution; (b) Habit sketch; (c) Leaf showing palmate attachment of leaflets.

lanceolate, broadly rounded at base, united to petiole for about one-third to two-thirds their length and clasping and more or less encircling the stem, mostly 5-8 mm long, entire or nearly so, acute, appressed-pubescent. Petioles short, mostly (0.5)1-1.5(2.5) cm long, slender, the median and lower several times longer than the stipules, the upper often equaled or even exceeded by the stipules. Leaves pinnately 3-foliolate, the terminal leaflet on rachis-stalk about 1-3 mm long; the leaflets on petiolules about 0.2-0.5 mm long, their blades oblong-obovate, cuneate-obovate or obovate-lanceolate, obtusely rounded, truncate or emarginate, usually denticulate above the middle, mostly (6)8-12(15) mm long and about 2-times as long as wide but varying from about as wide as long to almost 3-times as long as wide, glabrous to sparsely pubescent. Heads globose or ovoid to short-cylindrical, about 0.5-1.5 cm long and 0.8-1.2 cm thick on erect peduncles mostly 1-3 cm long with numerous (usually about 20-40), closely associated flowers about 2.5-5.5 mm long on pedicels about 0.2-0.8 mm long, recurving with age and apparently naked as the bracts are extremely minute. Calyx glabrous, the tube 5-nerved, campanulate, about 0.5-0.8 mm long; the lobes very unequal, the upper two about 0.2 mm long or less, deltoid, the lower three about 0.8-1 mm long, linear-subulate, longer than or about equaling the tube in length. Petals yellow, turning brownish when dry and persisting, about 2.5-5.5 mm long, the standard conspicuously longer than the wing and keel petals, conspicuously striate. Legume oblong, exserted from the calyx-tube, about 3 mm long including the stipe of about 0.8-1 mm, 1-seeded.

DISTRIBUTION: Native of Eurasia and northern Africa centering about the Mediterranean region. Naturalized throughout the eastern United States and also along the Pacific Coast.

This HOP CLOVER is readily distinguished from our other two by its stalked terminal leaflets (i.e. a rachis is present) and its conspicuously striate petals.

14. TRIFOLIUM DUBIUM Sibth., Fl. Oxon. 231. 1794.

Annual or biennial herb with slender, much-branched roots and decumbent, ascending or occasionally erect stems mostly 1-3 dm long and usually diffusely branched or occasionally simple, glabrate or sparsely short-pubescent or even densely so above. Stipules obliquely ovate, one side broadly rounded, acute, mostly 4-8 mm long, sparsely pubescent, adnate to the petiole for about one-third

to two-thirds their length. Petioles very short, mostly 3-8(10) mm long. Leaves pinnately 3-foliolate, the terminal leaflet on rachis-stalk about 1-3 mm long, leaflets with very short petiolules about 0.5 mm long or less, mostly cuneate-obovate, about 6-12 mm long, about half as wide as long to as wide as long, broadly rounded, truncate or emarginate, serrulate to denticulate above the middle, glabrous. Heads hemispherical but becoming spherical, small, mostly 5-8 mm thick on filiform peduncles mostly 5-25 mm long with relatively few (mostly 3-15) flowers about 2.5-3 mm long on pedicels about 0.2 mm long subtended by minute, scale-like bracts usually shorter than the pedicels. Calyx glabrous, the tube campanulate, 5-nerved, about 0.8-1 mm long, the lobes very unequal, the lower three lobes the longest, linear, about 0.8-1.2 mm long, the upper two lobes triangular-dentate, about 0.2-0.5 mm long. Petals yellow, turning brown, about 2.5-3 mm long, the standard longer than the wing and keel petals and only inconspicuously veined or at least not becoming striate and furrowed in fruit. Legume oblong, exserted from the calyx-tube, about 2.5-3 mm long, including the stipe of about 0.8-1 mm long, 1-seeded.

DISTRIBUTION: Native of much of Europe; now naturalized throughout most of eastern North America and along the Pacific Coast.

This HOP CLOVER differs from our one other species possessing a stalked terminal leaflet (i.e. a rachis is present) in possessing few-flowered clusters of 3-15 non-striate flowers.

14. MELILOTUS Mill., Gard. Dict. Abridged ed. 4. vol. 2. 1754.

Annual or biennial herbs with petiolate, pinnately 3-foliolate leaves; the terminal leaflet with a rachis-stalk and all leaflets shortly petiolulate and serrulate. Stipules mostly lanceolate to subulate. Flowers papilionaceous, usually small, in slender, peduncled, axillary, spikelike racemes on mostly short, reflexed pedicels subtended by setaceous, usually persistent, minute bracts. Calyx campanulate with nearly equal, subulate to lanceolate, acute to acuminate lobes. Petals deciduous after anthesis, white or yellow, free from the staminal tube, the wing and keel petals more or less coherent. Stamens diadelphous, 9 and 1. Ovary sessile or shortly stipitate; style slender, beardless and incurved above; stigma small and terminal. Legume ovoid to globose, extending from the calyx-tube, straight or nearly so, usually

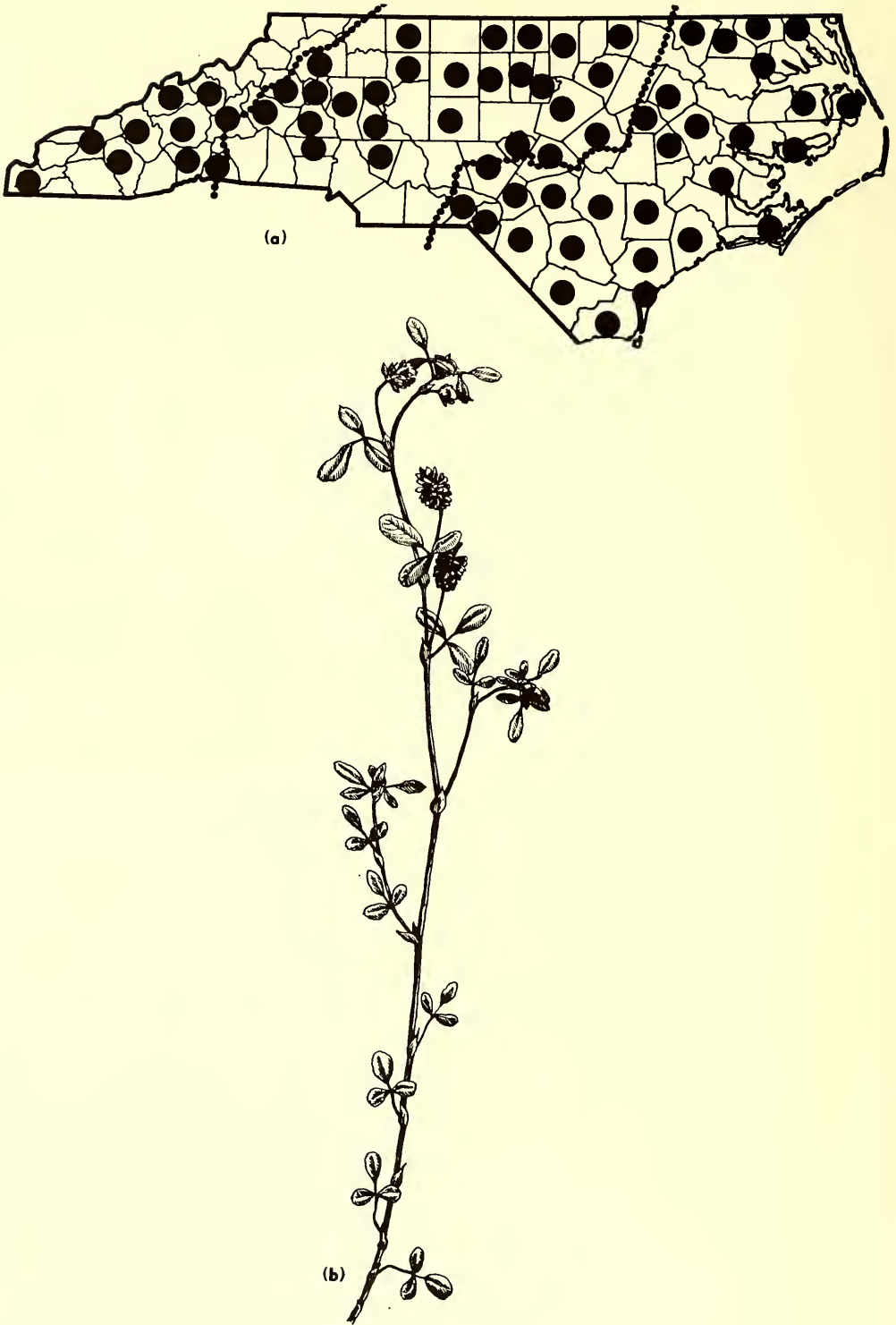


Fig. 43. *Trifolium campestre*. (a) Distribution; (b) Habit sketch.

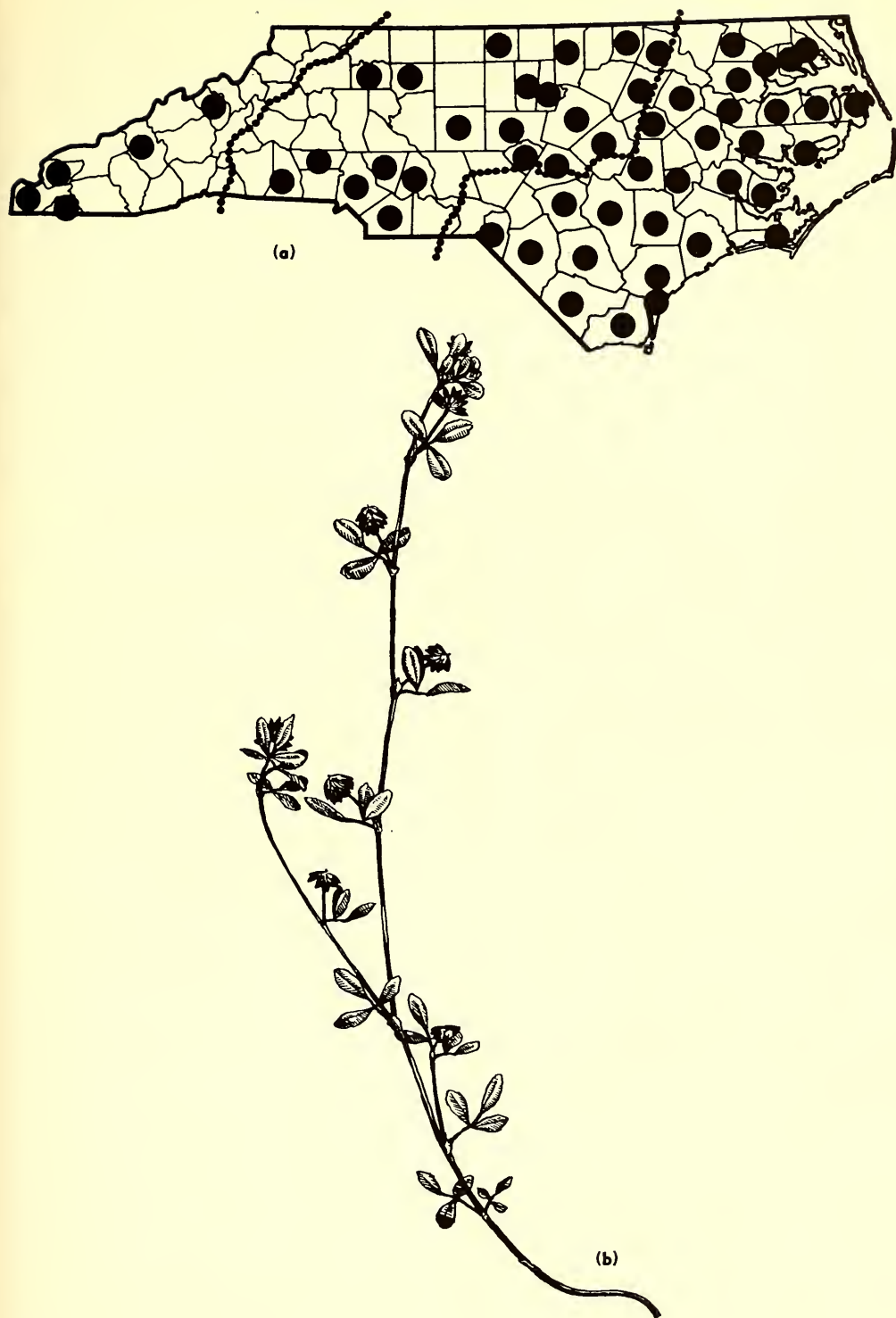


Fig. 44. *Trifolium dubium*. (a) Distribution; (b) Habit sketch.

1-seeded, commonly nerved, indehiscent or nearly so.

A genus of perhaps 20 species native of Europe, Asia and Africa and largely centered about the Mediterranean Sea. (Name derived from the Greek *meli* = honey and *lotus* = unknown leguminous plant).

Although several recent authors (including Gleason, Isley and Shinnars) have treated this name as of the masculine gender, I am following the majority of authors in considering it feminine. Voss (Paps. Mich. Acad. 42: 24. 1957) briefly outlines the botanist's confusion concerning the gender of the name.

1. Petals yellow, standard and wings about equal in length, the keel somewhat exceeding the wings; legume yellowish to light brown or reddish.

2. Petals less than 3 mm long (usually about 2 mm); stipules of lower leaves widened below the middle into scarious margins, partly encircling the stem and with a small basal auricle; annual with stems usually 5 dm high or less; flowering racemes usually less than 4 cm long (rarely longer) and flowers densely crowded; legume yellowish to reddish 1. *M. indica*.

2. Petals 3.5 mm long or longer; stipules lanceolate but not broadly scariously winged at base and lacking a free basal auricle; usually biennials with stems mostly 5 dm high or more; flowering racemes usually 5 cm long or longer and flowers not densely crowded; legume usually light brown or tan 2. *M. officinalis*.

1. Petals white, standard somewhat longer than the wings, the keel and wings about equal in length; mature legume dark brown to blackish 3. *M. alba*.

1. MELILOTUS INDICA (L.) All., Fl. Ped. 1: 308. 1785.

Annual herb with spreading to ascendent stems usually about 1-5 dm high, glabrate to sparingly pubescent above and arising from a slender taproot. Stipules lanceolate, about 5-7 mm long, those of the lower leaves widened below the middle, scarious and partly encircling the stem and with a small, free, basal lobe. Petioles slender, about 1-4 cm long. Leaves pinnately 3-foliolate, the rachis-stalk of the terminal leaflet about 2-3 mm long; leaflets petiolulate, usually oblanceolate to obovate, cuneate, about 1-2.5 cm long and 5-10 mm wide, with the upper half or more of margin sharply serrate, glabrous above,

sparsely pubescent below, usually truncate or emarginate. Racemes numerous, spike-like, axillary, mostly 1-5 cm long on peduncles usually 1-3 cm long with usually 10-60 flowers borne on very short, recurved pedicels about 0.6-0.9 mm long, subtended by setaceous, persistent bracts about 1-1.5 mm long. Calyx glabrous to very minutely short-pubescent, the tube campanulate, about 0.6-0.9 mm long, the lobes about 0.5-0.8 mm long, linear. Petals yellow, about 2-3 mm long, standard and wings about equal in length. Legume compressed ovoid to obovoid, about 1.5-2.5 mm long, very shortly stalked, yellow or reddish.

DISTRIBUTION: Native of the Mediterranean area and now naturalized in the temperate areas of every continent. The SOUR CLOVER is widespread in the United States but rarely encountered in North Carolina.

2. MELILOTUS OFFICINALIS (L.) Lam., Fl. Fr. 2: 594. 1778.

Biennial (or rarely annual) herb with a deep-seated, often much-branched taproot and erect or ascending stems mostly 4-10 (20) dm high, glabrous or slightly pubescent above. Stipules lanceolate, acute, mostly 5-8 mm long, entire. Petioles slender, mostly 1-4 cm long. Leaves pinnately 3-foliolate, the rachis-stalk of the terminal leaflet mostly 3-7 mm long, leaflets petiolulate, oblanceolate, obovate, oblong-elliptic or elliptic-lanceolate, mostly 1-2.5 cm long and 5-15 (20) mm wide, closely and sharply serrate for at least the upper two-thirds of the margin, rounded or obtuse at apex, glabrous above, glabrate below at maturity. Racemes axillary, mostly 4-12 cm long, spike-like on peduncles about 1-3 cm long, bearing approximately 30-70 flowers on recurved pedicels about 1.5-3 mm long subtended by setaceous, persistent bracts about 1-2 mm long. Calyx sparingly short-pubescent to glabrate, the tube about 1-1.5 mm high, rounded or somewhat gibbous and not gradually tapering to base, the lobes subulate, about 0.6-1 mm long. Petals bright yellow (becoming paler with age), mostly 4.5-7 mm long, the wings as long as the standard or nearly so. Ovary stalked, glabrous. Legume ovoid, about 2.5-4 mm long, 2-2.5 mm wide and 1.5 mm thick, distinctly short-stalked, glabrous, usually light brown to tan at maturity, the crosswise ridges more prominent than those running lengthwise.

DISTRIBUTION: The YELLOW SWEET CLOVER is native of Eurasia but is now widely naturalized throughout much of the United States and in other temperate areas.

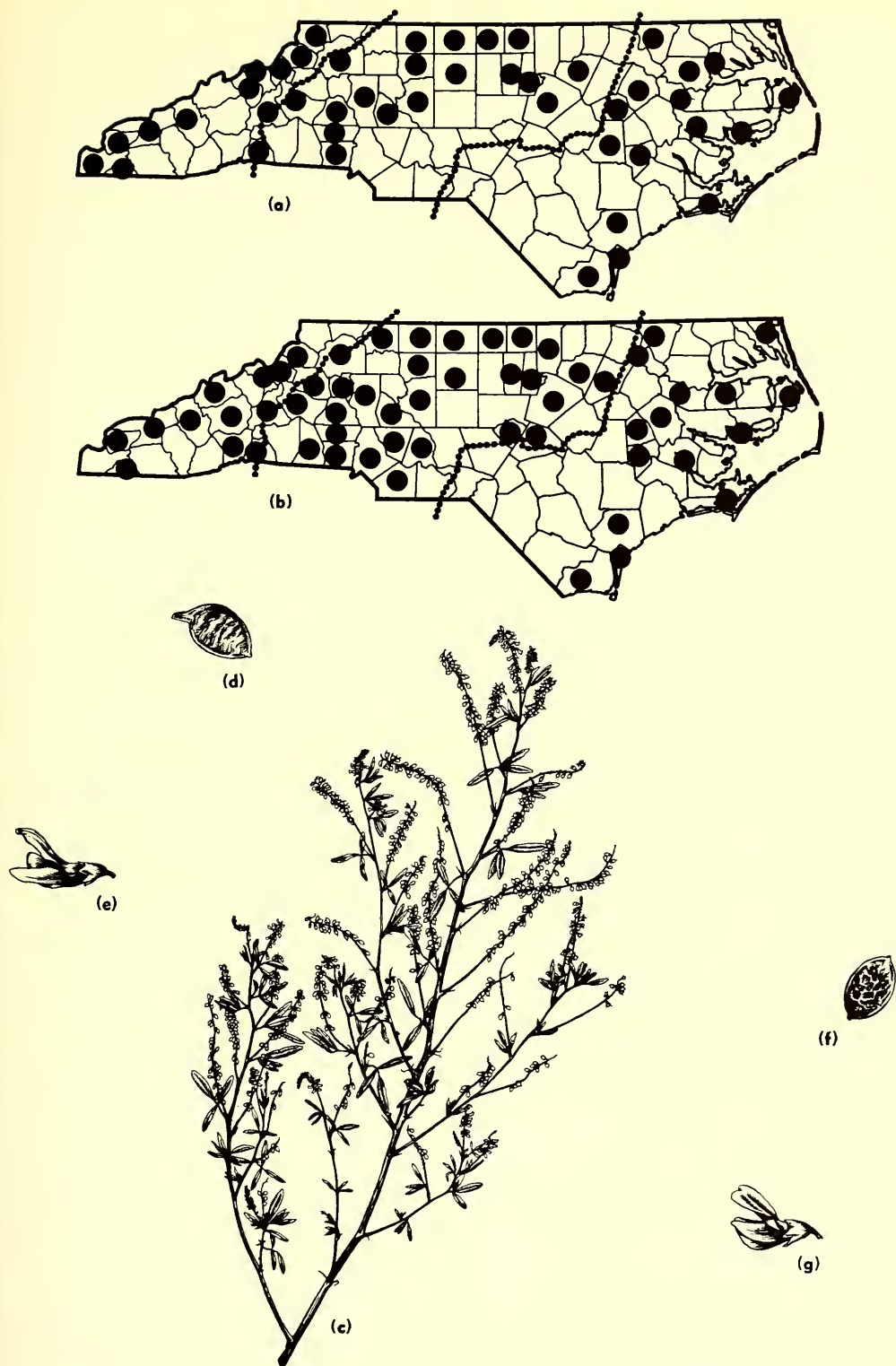


Fig. 45. *Melilotus officinalis* and *M. alba*. (a) Distribution of *M. officinalis*; (b) Distribution of *M. alba*; (c) Habit sketch of *Melilotus*; (d) Fruit of *M. officinalis*; (e) Flower of *M. officinalis*; (f) Fruit of *M. alba*; (g) Flower of *M. alba*.

3. MELILOTUS ALBA Desr., in Lam.
Encyc. Meth. 4: 63. 1797.

Biennial (or rarely annual) herb with a thick, upright, little-branched taproot and 1 to many, usually erect stems about 0.3-1.5(3) m high, more or less short-pubescent above but glabrous below. Stipules mostly 6-10 mm long, linear-subulate or almost setaceous, entire or nearly so, at least above. Petioles slender, ascendent, mostly 1-6 cm long. Leaves pinnately 3-foliolate, often deciduous soon after flowering, the terminal leaflet with rachis-stalk about 3-7 mm long; all leaflets with short petiolules about 1 mm long, leaflets oblanceolate, obovate, oblong, or elliptic, mostly 1-2.5(4) cm long and 8-12(20) mm wide, serrate for about two-thirds of the margin or more, obtuse, truncate or emarginate, glabrous above, appressed pubescent below. Racemes spike-like, numerous, mostly 4-10(12) cm long on peduncle about 1-4 cm long with numerous flowers (about 30-80 or perhaps 100) on recurved pedicels about 0.8-2 cm long subtended by setaceous, persistent bracts about 0.5-1 mm long. Calyx-tube campanulate, more or less gradually tapering from apex to base, about 0.6-1 mm high, minutely appressed-pubescent; calyx-lobes narrowly deltoid to subulate, about 0.5-1 mm long and about equaling the tube in length. Petals pure white, standard about 3-5 mm long and somewhat exceeding the wing and keel petals in length. Ovary sessile. Legume ovoid, about 2-3.5 mm long, 2-2.5 mm wide and about 1.5-2 mm thick, glabrous, very shortly stalked, usually dark brown to blackish at maturity, with net-work of moderately elevated nerves.

DISTRIBUTION: The WHITE SWEET CLOVER is native to Eurasia but is now widely naturalized (and often cultivated) throughout much of the United States and in other temperate regions.

15. MEDICAGO L., Sp. Pl. 778. 1753; Gen.
Pl. ed. 5. 337. 1754.

Annual or perennial herbs (one species a low shrub) with pinnately 3-foliolate leaves (i.e. the terminal leaflet on a short rachis-stalk). Leaflets mostly wedge-shaped and broadest above the middle, usually the upper half of the margin short-toothed or rarely entire with the stipules adnate to the petioles below. Inflorescence a spike-like or capitate raceme (or the clusters sometimes reduced to 1-3 flowers) with short pedicels subtended by small bracts. Calyx campanulate, the lobes almost equal. Corolla papilionaceous, usually yellow, or occasionally violet-blue; the standard obovate to oblong, the wings oblong and

the keel obtuse, all free from the stamens. Stamens diadelphous, 9 and 1. Ovary sessile or shortly stalked. Style subulate, lacking a beard; stigma capitate. Legume always longer than the calyx, arching or slightly curved to strongly spirally coiled, usually indehiscent, smooth or spiny, 1-several-seeded.

A genus of 50-100 or more species of Eurasia and Africa largely centered about the Mediterranean Sea. Widespread now in other temperate areas—(Name derived from the Greek *Media*, a land to the east of Greece from whence alfalfa was believed to have come. MEDIC (or Medick) is a common name for some of these plants and is derived from the same source.)

1. Petals typically blue or violet, 7-12 mm long; plant perennial with numerous, erect stems; legume loosely spirally coiled, always unarmed 1. *M. sativa*.

1. Petals yellow, 2-5 mm long; plants annual (or winter annuals), usually decumbent or ascendent, rarely erect; legume usually tightly spirally coiled, either spiny or unarmed.

2. Legumes lacking spines.

3. Legume 10-18 mm in diameter, light brown at maturity; stipules deeply divided, often beyond the middle; racemes usually with 5 flowers or fewer 2. *M. orbicularis*.

3. Legume 2-3 mm in diameter, blackish at maturity; stipules entire or at least not divided beyond middle; racemes usually 10-50-flowered 3. *M. lupulina*.

2. Legumes spiny.

4. Spines in 2 rows, the rows separated by a furrow; spines arching but only infrequently hooked at extreme apex; leaflets commonly with a conspicuous dark reddish blotch on upper side 4. *M. arabica*.

4. Spines in 2 or 3 rows arising from an elevated ridge, spines usually minutely hooked; leaflets lacking dark reddish patch.

5. Stipules entire or toothed but not divided beyond the middle; stems densely spreading-pilose, leaflets conspicuously pilose on both surfaces; legume pubescent between the spines 5. *M. minima*.

5. Stipules deeply lacerate, divided beyond the middle; stems glabrate to sparingly short-pubescent, leaflets glabrous or nearly so above, short-pubescent beneath; legume glabrous 6. *M. polymorpha*.

1. *MEDICAGO SATIVA* L., Sp. Pl. 778. 1753.

Perennial herb about 3-10 dm high with numerous, erect to ascendent, glabrous or sparsely pubescent (especially when young) stems arising from a deep-seated, woody taproot. Stipules lanceolate, acuminate, entire or usually so, about (5)8-15(20) mm long, usually fused to the petiole for the basal 2-5 mm. Petioles slender (0.5)1-2(2.5) cm long or more. Leaves pinnately 3-foliolate; leaflets petiolulate and the terminal also on a rachis-stalk about 2 mm long, obovate, narrowly oblong or oblanceolate with often cuneate base and toothed apex (often the teeth extending for about one-third the length of margin), about 1-3 cm long, mostly 3-8 mm wide, or generally 3-times or more as long as wide, glabrous to pubescent. Racemes axillary on peduncles usually 1-3 cm long, spike-like (subglobose to cylindrical), usually elongate, about 1-4 cm long, 1-2 cm thick, about 10-20(30) flowered. Pedicels about 1-2 mm long, subtended by a setaceous, persistent bract about 1-2(3) mm long. Calyx-tube about 2-3 mm long, the teeth narrowly lanceolate, acuminate, equal or nearly so, about 3-4 mm long, both tube and lobes loosely pubescent. Petals 7-12 mm long, blue-violet to purple (or rarely white or varicolored). Legume loosely and spirally coiled with 1-3 turns, about 4-5 mm in diameter, finely pubescent.

DISTRIBUTION: ALFALFA is probably native to the area northeast of the Mediterranean Sea. Cultivated for 2500 years or more and now widespread in all temperate regions. Naturalized throughout much of temperate North America. Nationally our most important forage crop.

2. *MEDICAGO ORBICULARIS* (L.) Bartalini, Cat. delle Piante . . alla Citta di Sienna. 60. 1776.

Annual herb with decumbent to ascendent stems up to 5 dm long, glabrous to sparingly pubescent. Stipules pectinate with the lacerate divisions extending nearly to the midrib, mostly less than 1 cm long. Petioles above mostly about 1-2 cm long. Leaves pinnately 3-foliolate, the terminal upon a rachis-stalk about 2-4 mm long; the leaflets petiolulate, mostly 8-18 mm long and 5-10 mm wide, obovate to obcordate or rhombic, toothed for often one-half or more of the margin from apex towards the base, glabrous or nearly so. Racemes axillary on short, slender, arching peduncles mostly 1-2 cm long bearing 1-5 flowers (and often additional bracts) on pedicels about 0.5-1(2) mm long subtended by linear-subulate bracts about 1-2 mm long.

Calyx-tube about 1 mm long, the lobes 1-1.5 mm long, subulate. Petals bright yellow, about 3 mm long. Legumes often coiled into 4-6 tight spirals, flattened, 1.0-1.8 cm in diameter, spineless, glabrous, strongly reticulate.

DISTRIBUTION: Native of the Mediterranean region. Occasional introduced and becoming naturalized in numerous, widely scattered areas of the United States.

3. *MEDICAGO LUPULINA* L., Sp. Pl. 779. 1753.

Annual (or biennial) herb with numerous, decumbent, pubescent to glabrate, more or less 4-angled branches 1-4(6) dm long arising from a slender taproot often 1-3 dm or more long. Stipules lanceolate or ovate-lanceolate, acuminate, usually 5-10 mm long, adnate to the petiole for about 2-3 mm (or about 1/4 of their length), entire or slightly toothed. Petioles mostly about 5-20 mm long. Leaves pinnately 3-foliolate with petiolulate, broadly obovate, nearly orbicular to almost elliptical, pubescent leaflets with teeth usually extending basally about one-third the length of the margin from apex, mostly 1-2 cm long and 3-10 mm wide. Racemes axillary on slender, pubescent to glabrate peduncles about 0.5-4 cm long, subglobose to short-cylindrical, 10-50-flowered, about 7-10 mm long. Pedicels very short, less than 1 mm long and usually even 0.5 mm or less in length, subtended by a very minute, setaceous, persistent bract about 0.1-0.2 mm long. Flowers small, about 2-3(4) mm long; the calyx short-pubescent, about half the length of the petals, the tube about 0.5 mm long, the lobes acuminate, 0.6-1 mm long. Petals yellow, deciduous in fruit. Legume nearly black at maturity, somewhat kidney-shaped, reticulate, spineless, 1-seeded, 2-3 mm in diameter, minutely pilose to glabrate or in some forms with spreading glandular hairs.

DISTRIBUTION: Widespread throughout most of Europe, Asia and North Africa and most of the United States. Native of Eurasia but it has been so long associated with mankind that its original home cannot be established with any certainty.

A so-called variety, *M. lupulina* var. *glandulosa* Neilr., is distinguished by the presence of widely spreading, short-stalked, glandular hairs on both the peduncles and fruits. It is occasionally encountered within North Carolina but apparently is not as common as the non-glandular form of the BLACK MEDIK.

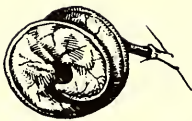
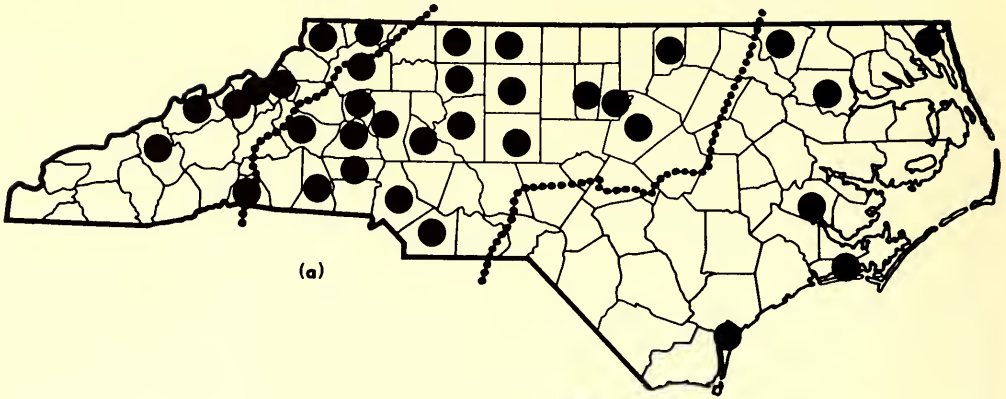


Fig. 46. *Medicago sativa*. (a) Distribution; (b) Habit sketch; (c) Fruit.

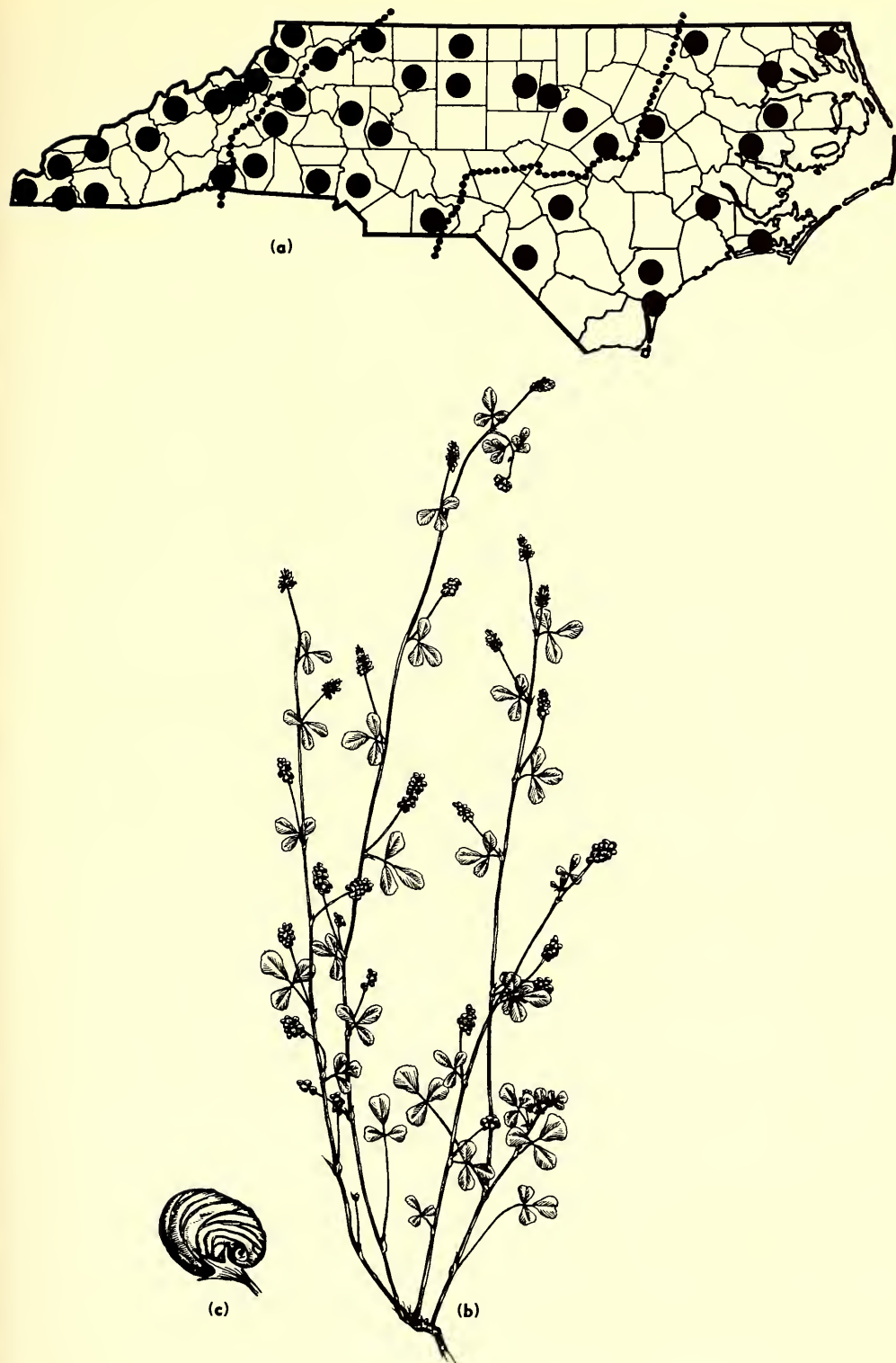


Fig. 47. *Medicago lupulina*. (a) Distribution; (b) Habit sketch; (c) Fruit.

4. *MEDICAGO ARABICA* (L.) Huds., Fl. Angl. 288. 1762.

Annual herb with decumbent to ascendent stems mostly 3-6 dm long, glabrous or slightly pubescent. Stipules ovate-lanceolate, mostly 5-10 mm long, with numerous, acuminate, lacerate teeth extending halfway or less towards the middle. Petiole slender, mostly 0.5-5(8) cm long. Leaves pinnately 3-foliolate; the leaflets petiolulate, obovate to obcordate, about as broad as long or even broader, mostly 1-2.5 cm long, apically toothed, usually truncate or broadly retuse, glabrous or nearly so above but pubescent below, usually with a conspicuous reddish spot near the center on the upper side. Peduncles slender, mostly 1-2.5 cm long with usually 1-5 flowers on very short pedicels about 0.2-0.5(1) mm long and usually much shorter than the calyx-tube, subtended by subulate bracts about 1 mm long. Calyx-tube sparsely pubescent, about 1 mm long, the lobes about 2-times or more as long as the tube and mostly about 2 mm long. Petals about 4-5 mm long, bright yellow, the standard slightly longer than the keel which in turn is longer than the wings. Legume almost globose, spirally coiled 4-6(7)-times, with a double row of curved spines about 2-3 mm long with a furrow on the edge between the rows, about 5-6 mm thick excluding the spines or including them about 9-12 mm in diameter.

DISTRIBUTION: The SPOTTED MEDIK or SPOTTED BUR CLOVER was introduced from Europe and now is widely naturalized throughout much of the United States.

5. *MEDICAGO MINIMA* (L.) Grufb. ex L., Amoen. Acad. 4: 105. 1759.

Annual herb with simple or branching, decumbent to erect, softly and densely spreading-pubescent stems 1-3(5) dm long. Stipules ovate-lanceolate, entire or short-toothed, about 4-7 mm long. Petioles mostly short, 3-15(20) mm long. Leaves pinnately 3-foliolate, the terminal leaflet on rachis-stalk 2-3 mm long, leaflets short-petiolulate, obovate or cuneate-oblong, mostly 5-10(15) mm long, apically toothed for as much as one-half of margin, rounded, truncate or even slightly emarginate at the apiculate apex, rather densely soft-pilose on both surfaces. Racemes capitate, on axillary peduncles about 1-2.5 cm long with (1)3-5(8) flowers on short, pilose pedicels about 0.5-1 mm long subtended by minute, abruptly acuminate bracts about 0.2 mm long or less. Calyx densely pilose, the tube about 1 mm high, the lobes 1-1.5 mm long. Petals

bright yellow, about 3-4 mm long. Legume almost globose, spiny, including the spines about 5-12 mm in diameter, or excluding them about 3-5 mm in diameter, slightly pubescent, 3-5-times spirally coiled; the spines nearly straight, about 2-3 mm long, hooked at the tip.

DISTRIBUTION: The BUR CLOVER is an introduced weed native to the Mediterranean area and western Asia. Locally naturalized in the Southeastern States.

Shinners (1956), whose detailed and very useful account of the authorship and nomenclature of the species of the genus growing wild in this country has proved itself most helpful, attributes this combination to Bartalini whose publication dates from 1776. Shinners rejects Grufberg's authorship since it is not certain that his bare listing of the name as a species was not "a minor error in printing." However, until it can be shown that it was an actual error rather than a suspected one, I believe that the binomial, which first appeared in Grufberg's brief account, should be accepted as a new combination.

6. *MEDICAGO POLYMORPHA* L., Sp. Pl. 779. 1753.

M. hispida Gaertn., Fruct. & Sem. 2: 349. 1791.

Annual herb with numerous, prostrate to ascendent, glabrate to puberulent stems about 2-5 dm long. Stipules, at least of the upper leaves, deeply incised almost to the middle or beyond, the segments linear-filiform; about 6-10 mm long. Petiole slender, mostly 1-5 cm long. Leaves pinnately 3-foliolate, the terminal leaflet long-stalked, its rachis 2-5 mm long; leaflets petiolulate, cuneate-obovate to obcordate, mostly 6-15 mm long, obtuse, truncate to retuse, apically toothed for as much as the upper half of the margin from apex towards the base, lacking a large brownish or purplish splotch, glabrous above, sparingly pubescent to glabrate beneath. Racemes axillary with peduncles mostly 1-3 cm long or about equaling the subtending leaf, bearing (1)3-5(8) flowers in small, capitate cluster on pedicels about 0.5-1 mm long subtended by minute, lanceolate bracts about 1-1.5 mm long. Calyx slightly pubescent, the tube about 1 mm long, the lobes about 2 mm long. Petals yellow, about 2.5-4 mm long. Legume usually 2-5-times spirally coiled, 4-6 mm in diameter excluding the spines; the spines 2-3 mm long, straight except for the usually minutely

hooked tip, in 2 rows arising from and separated by a raised keeled ridge.

DISTRIBUTION: Native to the Mediterranean area but now widespread having been introduced and become naturalized in most warm-temperate areas. Common throughout much of the eastern United States.

Numerous varieties have been distinguished but no attempt was made to assign our representatives to these named variants. Shinnars (1956) presents a detailed account of the bur clovers found in the United States and deals in great detail with the variants of this species.

16. LOTUS L., Sp. Pl. 773. 1753; Gen. Pl. ed. 5. 338. 1754.

Hosackia Benth., Bot., Reg. 15: pl. 1257. 1829.

Acmispon Raf., Atl. Jour. 1: 144. 1832.

Annual or perennial herbs (or rarely suffrutescent) with pinnately compound leaves (rarely appearing palmate) with 1-15, entire leaflets. Stipules gland-like (at least in ours) but occasionally the lowermost leaflets simulating stipules (and are so-called by some authors). Flowers pedunculate in axillary umbels or the cluster reduced to a solitary flower, usually leafy-bracteate. Calyx cylindrical to campanulate with more or less equal lobes. Corolla papilionaceous with petals whitish to yellow and often tinged or streaked with red, rose or purple; standard ovate to obovate, wings obovate or oblong and adhering to the incurved keel of usually fused petals. Stamens diadelphous, filaments all or partly expanded just below the anthers. Ovary sessile, one to many ovuled topped by a long incurved style. Legume linear, straight to strongly curved, dehiscent or indehiscent.

Genus of perhaps 140 species found on all the continents but principally centered about the Mediterranean Sea and in western North America. (A Greek name for several different kinds of plants.)

Consistency should dictate treating the gender of this genus as feminine as is usually done with *Melilotus*. Voss (Paps. Mich. Acad. 42: 24. 1957) does so treat it and there presents his reasons for so doing. Many authors treat both generic names as masculine.

1. Leaves pinnately 3-foliolate; peduncles but slightly exceeding the leaves in length; in-

florescence 1-(or rarely 2-) flowered and subtended by a 1-foliolate bract; an erect annual 1. *L. Helli*.

1. Leaves pinnately 5-foliolate; peduncles 2-times or more the length of the leaves; inflorescence several to many flowered and subtended by a 3-foliolate bract; a trailing perennial 2. *L. corniculatus*.

1. LOTUS HELLERI Britt., Bull. Torrey Club 17: 312. 1890.

Acmispon Helli (Britton) Heller, Cat. N. Am. Plants ed 3: 205. 1914.

Hosackia Helli (Britton) Blomq. & Oosting, Guide to Spring and Early Summer Fl. Piedmont, N. Carolina 79. 1940.

Erect, annual herb mostly (2)3-6(7.5) dm high from a woody taproot about 5-10(15) cm long and with numerous, wide-spreading to ascendent branches. Branches and stems glabrate (especially below) to moderately spreading villous-pubescent. Stipules minute, represented by blackish or reddish-brown glands. Petioles of primary leaves about 1 mm long or less and those of the branches about 0.5 mm long or less and then the leaves often appearing sessile. Leaves pinnately 3-foliolate and the leaflets with petiolules about 0.5 mm long or less and the terminal leaflet usually borne on a rachis-stalk of about 0.5-2 mm long. Leaflets usually narrowly elliptic to linear, acute, slightly mucronulate, about (0.5)0.8-1.2(1.8) cm long and about (1)2-3.5(5) mm wide, the lateral asymmetrical, completely glabrous or the margins villous, and the surfaces glabrous to sparsely villous. Peduncles equaling or exceeding the subtending leaves by about 3-10 mm but elongating in fruit, slender, (often 1.5-2 cm long) and bearing one flower on a pedicel about 0.5-1 mm long subtended by a 1-foliolate, leaf-like bract 3-7 mm long. Calyx-tube about 1.2-1.8 mm long, cylindrical, glabrous to very sparsely villous-pubescent; the lobes linear, acute, about 2.8-4 mm long, usually a little more than twice as long as the tube but shorter than the wing-petals, glabrous to long-pilose. Petals 4-8 mm long, the keel yellowish, the wings yellowish and tinged with pink, the standard pale pink. Legume about 2-3.5 cm long and 2-3.5 mm wide, linear, glabrous, spreading to deflexed at maturity, dehiscent.

DISTRIBUTION: Apparently restricted to the Piedmont of North and South Carolina.

Britton's taxon may eventually prove to be worthy of no more than varietal status

(or perhaps even be submerged completely) within the extremely wide-spread and polymorphic species which has been most often referred to in our eastern manuals as *Lotus americanus* (Nutt.) Bisch. This last mentioned species is a most variable complex and one from which numerous species have in the past been segregated. This so-called species is abundant and widespread in the western states and extends eastward to perhaps the eastern limit of the Plains or even onto the Prairies. Its more eastern stations, and especially those east of the Mississippi River, are usually attributed to recent introduction by man. In any event until this entire bewildering complex is carefully analyzed, it seems best to treat as a distinct, although obviously closely related, species those glabrous or but sparsely villous-pubescent plants whose calyx-lobes are shorter than the wing-petals and whose leaflets are linear to narrowly elliptic. The exceedingly variable series of plants which pass for *L. Purshianus* (Benth.) Clement & Clement (= *L. americanus*) are almost invariably densely pubescent on both stem and leaf and whose leaflets are mostly elliptic to elliptic-oblong and whose calyx-lobes often, although not always, are as long as the wing-petals or even longer. The only specimens which I have seen which possibly might be confused with those which I consider *Lotus Helleri* are a few collections from Arkansas and Missouri.

Small (1933, p. 687) separated the two species, which he placed in the segregate genus *Acmispon*, in his key as follows:

Calyx-lobes less than twice as long as the tube, not surpassing the wings. . . . *A. Helleri*.
Calyx-lobes fully twice as long as the tube, surpassing the wings. *A. americanum*.

The three original collections upon which Britton based his description all apparently came from central North Carolina (Heller's from Rowan Co., Curtiss' from Mecklenburg Co., and Schweinitz's collection unspecified but perhaps from the area about Salem in Forsyth Co.)

McVaugh (Ecol. Monogr. 13: 156, 165. 1943) includes this species as a relatively rare taxon which apparently has some affinity for granitic outcrops.

Tentatively, then, on the basis of an

admittedly superficial study, *L. Helleri* appears to be a distinct entity from *L. Purshianus* Clements & Clements (= *Hosackia americana* (Nutt.) Piper and *Lotus americanus* (Nutt.) Bisch. (1839) not *L. americanus* Vell. (1825) but further study of the entire complex is obviously needed.

2. LOTUS CORNICULATUS L., Sp. Pl. 775. 1753.

Perennial herb from a taproot with usually several to many prostrate to strongly ascending, finely striate, glabrous to sparsely short-pubescent, often much-branched stems mostly (1)3-5(6) dm long, often arising from a crown. Stipules reduced to a pair of darkish glandular spots but the lowermost pair of leaflets easily and often mistaken for them. Leaves subsessile with a petiolule less than 0.5 mm long, pinnately 5-foliolate with the leaflets borne on short petiolules about 0.2 mm long and the upper three leaflets attached at the tip of the rachis and with the terminal leaflet sessile and lacking an extended rachis-stalk. Leaflets elliptic, oblanceolate to obovate, glabrous or very nearly so to noticeably pubescent, about 5-15(25) mm long and 2-8(18) mm wide, acute to broadly rounded. Inflorescences loosely to compactly umbellate and borne on slender and usually elongate, glabrous (or nearly so), striate peduncles from the axils of the upper leaves and which typically exceed the length of the leaves by several to many times and with the cluster closely subtended by a usually 3-parted, leaf-like bract. Flowers borne on glabrous to short-pubescent pedicels mostly about 1-2 mm long. Calyx glabrous or less commonly sparsely to moderately pubescent; the tube somewhat turbinate to campanulate, about 1.5-2.5 mm long and usually about equaled by the linear, subequal calyx-lobes. Corolla yellow to orange-reddish and about 8-12(15) mm long, the standard as broad as long and exceeding the wing-and keel-petals. Legume about (1.5)2-3(4) cm long, more or less cylindrical, glabrous, wide-spreading and dehiscent at maturity and the valves twisting.

DISTRIBUTION: The BIRDSFOOT TREFOIL was introduced from Europe where it is still abundantly and commonly cultivated. Here it has become naturalized locally in widely scattered areas throughout eastern North America and also along the Pacific Coast.

In addition to the *Lotus corniculatus*, a close relative, which by some is even

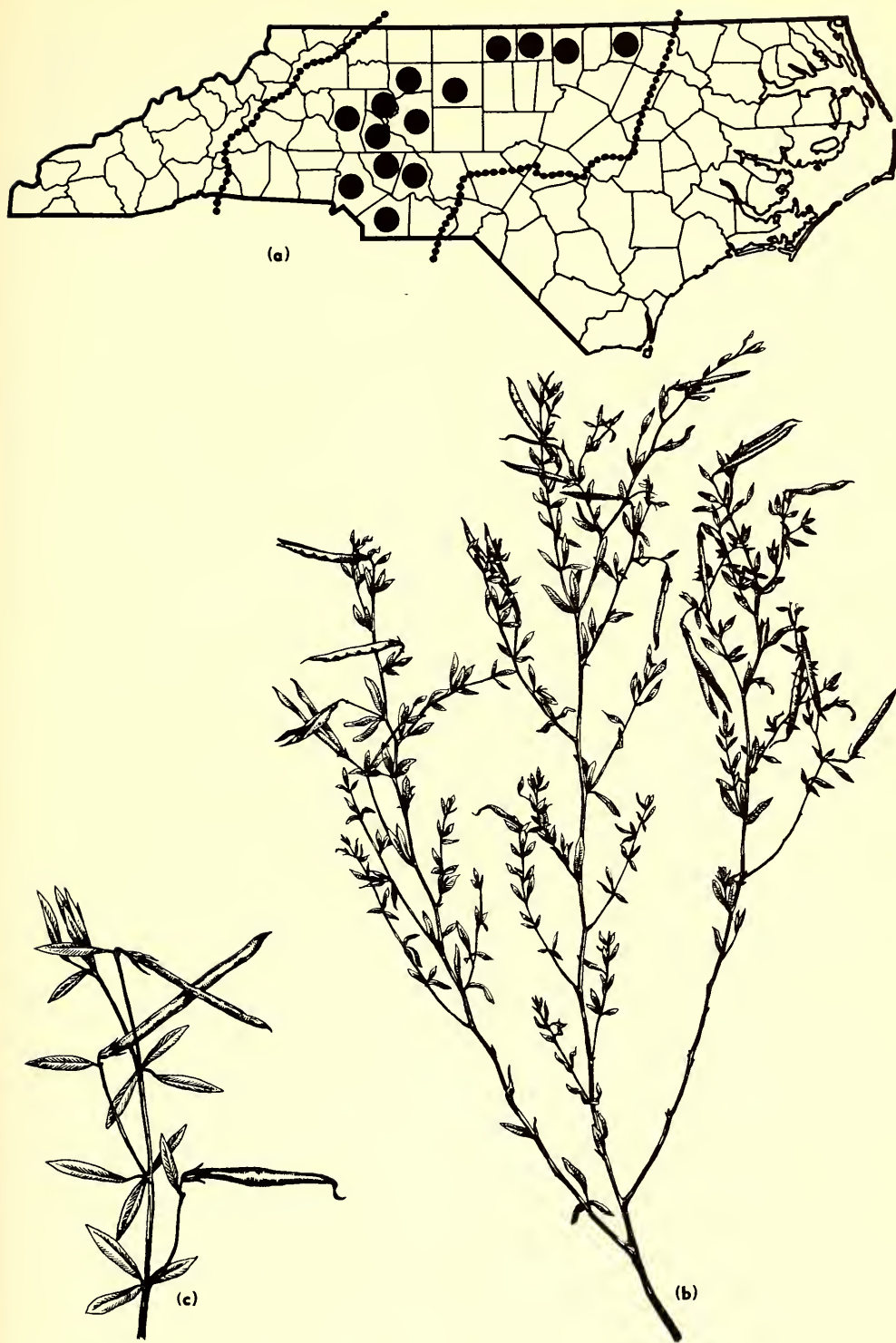


Fig. 48. *Lotus Helleri*. (a) Distribution; (b) Habit sketch; (c) Enlarged view of fruiting branch.

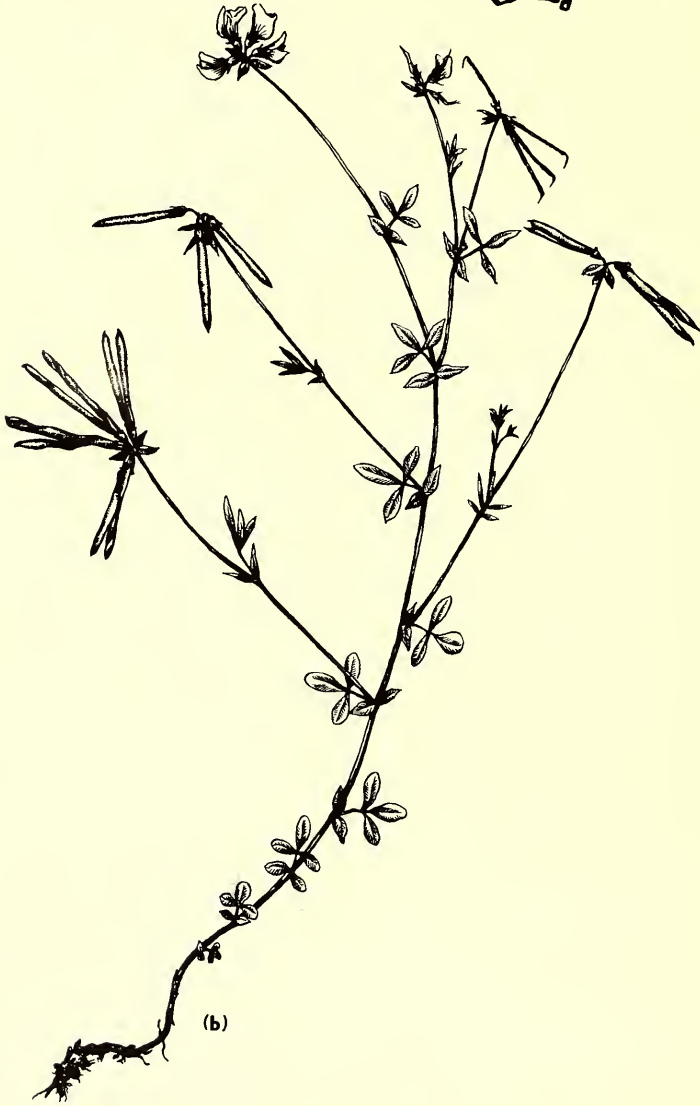
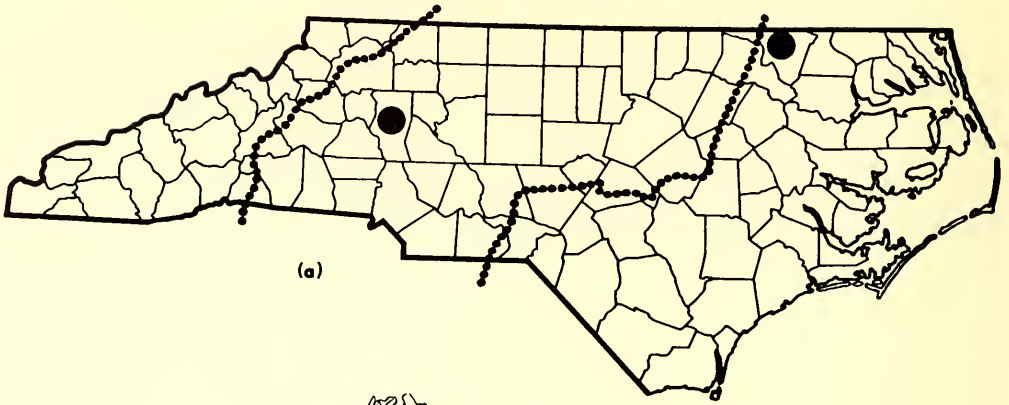


Fig. 49. *Lotus corniculatus*. (a) Distribution; (b) Habit sketch.

treated as its variety, apparently has been collected in North Carolina. A rather scrappy specimen made by G. McCarthy from ballast at Wilmington, 1885, is deposited at the National Herbarium. I believe it to be *L. tenuis* Kit. (= *corniculatus* var. *tenuifolius* L.) Isely (1951 b, p. 445, 449) summarized the evidence available and concluded that *L. tenuis* is specifically distinct from *L. corniculatus* stating that the former "appears to tolerate poorly drained or saline soil better" than the latter. Neither of these species is at present likely to be found in any abundance in North Carolina and *L. tenuis* apparently has been found but once. For that reason I have not included a description of it. The two have been distinguished from one another by Isely as follows:

1. Leaflets obovate to lanceolate, about half as broad as long or broader; flowers 12-16 mm long; standard as broad as long; chromosome number $2n = 24$ *L. corniculatus*.
1. Leaflets linear to lanceolate, less than half as broad as long; flowers 10-13 mm long; standard not broader than long; chromosome number $2n = 12$ *L. tenuis*.

17. AMORPHA L., Sp. Pl. 713. 1753; Gen. Pl. ed. 5. 319. 1754.

Suffruticose to large bushy shrubs. Stipules linear to setaceous, caducous. Leaves odd-pinnately compound with entire to crenulate, stipulate, petiolulate, glandular-dotted leaflets. Racemes terminal and from the upper axils, spike-like, elongate with short-pedicellate flowers less than 8 mm long subtended by setaceous to linear-subulate, caducous bracts. Calyx obconic, persistent, 5-lobed, toothed or merely undulate. Petal 1, the standard obcordate, cuneately narrowed into a claw, incurved and folded about the androecium and gynoecium, purplish, violet, blue or white. Stamens 10, filaments elongate and extending beyond the petal at maturity, united below into a monadelphous tube. Ovary sessile, 2-ovuled; style slender and antrorsely pubescent; stigma capitate and terminal. Legume oblong to obovate, often curved and asymmetrical, 1-2-seeded, indehiscent.

A genus of about 20 species native throughout much of the United States but most numerous in the Southeast. (Name derived from the Greek *amorphos* = deformed, in allusion to the absence of 4

petals.) The FALSE INDIGOS or INDIGO BUSHES.

1. Calyx-tube densely pubescent at maturity, the lobes (or at least the lowermost) half as long to as long as the tube; legume usually densely pubescent; leaves and young branches densely puberulent to short-pubescent throughout.
2. Suffruticose shrub usually less than 1 m high; leaves nearly sessile, the petiole usually shorter than the width of the lowermost leaflet; calyx with numerous, conspicuous, amber-colored punctate glands 1. *A. herbacea*.
2. Bushy shrub 1-2 m high; leaves long-petiolate, the petiole longer than the width of the lowermost leaflet; calyx with but few, inconspicuous punctate glands 2. *A. Schuererini*.
1. Calyx-tube glabrous or merely sparsely pubescent at maturity, the lobes obsolete or at least not as long as half the length of the tube; legume glabrous or very nearly so.
3. Rhizomatose suffruticose shrub usually less than 1 m high; upper and median leaves nearly sessile, the petiole usually shorter than the breadth of the lowermost leaflet 3. *A. cyanostachya*.
3. Bushy much-branched shrubs usually over 1 m high and often up to 3 or 4 m; upper and median leaves long-petiolate, the petiole longer than the width of the lowermost leaflet.
4. Calyx-lobes broadly rounded, very short and nearly obsolete; legume dorsally straight or nearly so, usually 3 mm wide or more; vegetatively glabrous or very nearly so; barely exerted midvein terminating in a globose tip 4. *A. glabra*.
4. Calyx-lobes or at least some of them acute and 0.5-1 mm long; legume conspicuously dorsally curved, usually less than 3 mm wide; vegetatively often short-pubescent; slightly exerted midvein terminating in a tapered tip 5. *A. fruticosa*.

1. AMORPHA HERBACEA Walt., Fl. Car. 179. 1788.

Suffruticose shrub with ridged and grooved, finely canescent, aerial stems mostly 5-10 dm high, usually unbranched below the paniculately arranged inflorescence branches and arising from a woody rhizome 0.5-1.5 cm thick. Stipules setaceous, caducous, about 1-2 mm long. Petioles of the median and upper leaves usually shorter than the breadth of the lowest

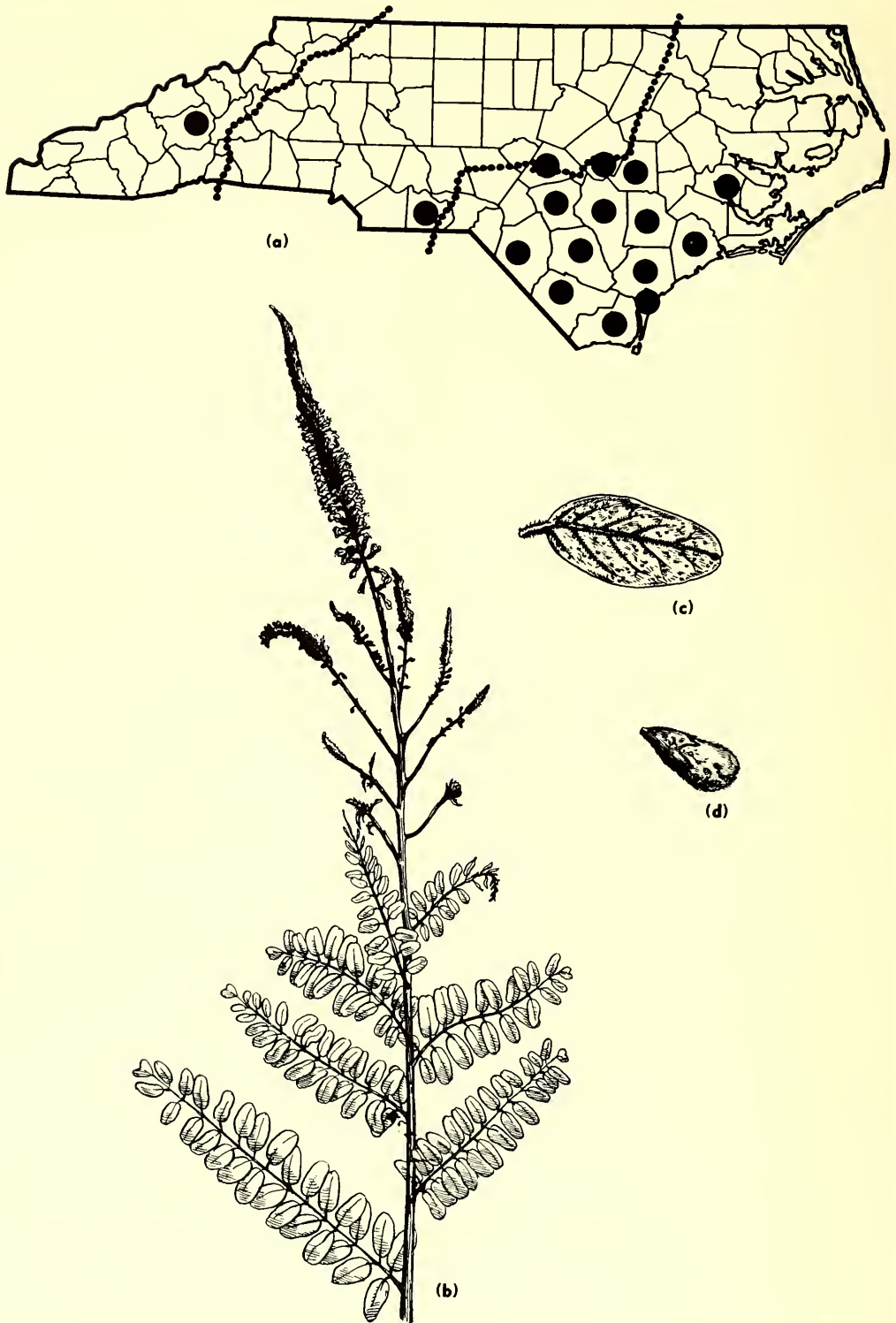


Fig. 50. *Amorpha herbacea*. (a) Distribution; (b) Habit sketch; (c) Leaflet; (d) Calyx and fruit.

leaflet, mostly 2-8(12) mm long (the lowest petioles sometimes longer). Leaves about (5)10-15(20) cm long, about (9)25-41-foliolate, each with a densely puberulent rachis. Leaflets with petiolules about 1-2 mm long, subtended by a setaceous stipel about 1 mm long, oblong, elliptic or oval, mostly 1-2 cm long and 6-10 mm wide, usually broadly rounded at both ends or occasionally abruptly pointed at the apiculate apex, short-pubescent upon both surfaces although more densely pubescent beneath, the lower surface with numerous (typically 150-200 or more) translucent, amber-colored dots with the midvein and secondary veins readily visible below; the midvein slightly excurrent from blade and terminated with a gland-like, more or less globose knob. Inflorescence of usually numerous (5-20 but rarely only 1), paniculately clustered, axillary or terminal racemes mostly 5-15(25) cm long and about 10-14 mm thick with very numerous, at first densely clustered but later more loosely arranged flowers attached to the densely puberulent rachis by pedicels about 0.4-0.8 mm long and subtended by subulate-setaceous, caducous bracts about 2 mm long. Calyx densely short-pubescent throughout, usually purplish, the tube turbinate, about 1.5-2 mm high with numerous amber-colored glands in the upper half; the lobes unequal, the two upper lobes triangular, about 0.6 mm long, the lateral narrower and slightly longer, the lowermost narrowly lanceolate-subulate and about 1-1.2 mm long. Petal broadly spatulate, emarginate, about 4-4.5 mm long, dull bluish-violet. Legume short-pubescent, about 3-5 mm long, dorsally straight or nearly so, ventrally strongly curved and the upper half densely covered with numerous dark glands.

DISTRIBUTION: Principally along the Coastal Plain from North Carolina into Florida.

2. *AMORPHA SCHWERINI* C. K. Schneid., Bot. Gaz. 43: 301. 1907.

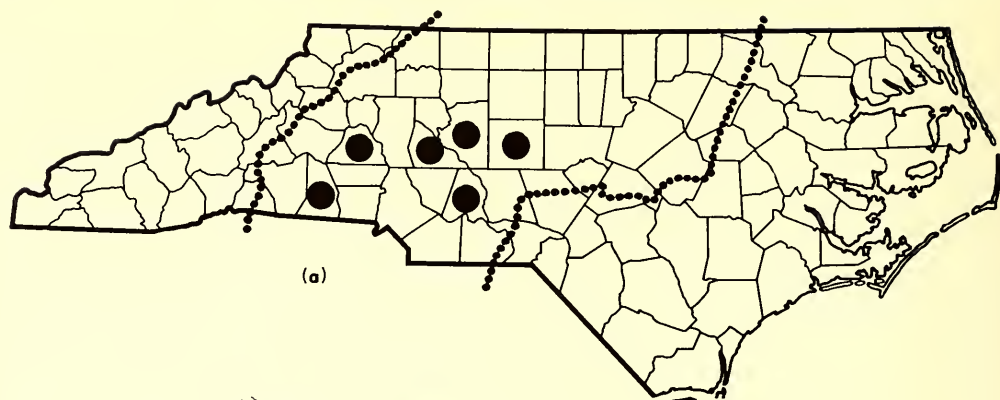
Shrub 1-2.5 m high with numerous appressed, short-pubescent branches. Stipules subulate, caducous, densely villous-tipped, more or less pubescent throughout, about 5-6 mm long. Petioles about (0.5)1-1.5(2.5) cm long, typically longer than the breadth of the lowest leaflet, densely pubescent. Leaves (5)8-15(20) cm long, 11-25-foliolate and with a densely short-pubescent rachis. Leaflets with densely puberulent petiolules about 1-2 mm long, subtended by a setaceous stipel about 1-1.5 mm long, elliptic, oblong or ovate-oblong, broadly rounded at both ends, commonly emarginate, mostly 1-3(4) cm long and 0.5-1.5 cm wide, the midveins conspicuous, the

secondary veins noticeable, the venation otherwise obscure, both surfaces densely short-pubescent, glandular-dots small and numerous but macroscopically usually not apparent or if so quite inconspicuous; midvein usually knob-tipped, excurrent for up to about 0.2 mm or less, commonly extending no further than margin of blade. Racemes usually terminal and solitary (or but few together), mostly (3)5-10 cm long and 1-1.5 cm thick with numerous, densely clustered flowers attached to the densely puberulent rachis by a densely puberulent pedicel about 0.8-1.2 mm long and subtended by a linear-subulate, caducous, puberulent bract about 3-4.5 mm long. Calyx moderately to densely grayish puberulent throughout with but few, scattered, inconspicuous, glandular dots; the tube about 1.8-2.5 mm long, turbinate; the lobes all linear-subulate, the lowermost longest and about 3-4 mm long, equaling or longer than the tube, the lateral and upper two lobes shorter, mostly 2-3 mm long. Petal broadly obovate, about 4-6 mm long and 3 mm wide. Legume about 4-6 mm long and about 2 mm broad, dorsally straight or nearly so, ventrally rounded, glandular-dotted above and usually densely puberulent but rarely glabrous or nearly so.

DISTRIBUTION: Piedmont North Carolina and Georgia.

3. *AMORPHA CYANOSTACHYA* M. A. Curtiss, Bost. Jour. Nat. Hist. 1: 140. 1835.

Suffruticose shrub 5-10 (reportedly up to 20) dm high with finely ribbed and grooved, glabrous or sparsely pubescent, aerial stem often much-branched and arising from a woody, often gnarled rhizome about 0.5-1.5 cm thick. Stipules subulate, caducous, glabrous, about 2-3 mm long. Petioles commonly 0.5-2 cm long, those of the upper and median leaves equaling or less than the width of the lowermost leaflet, lower petioles commonly exceeding in length the width of the lowest leaflet, glabrous or nearly so. Leaves mostly 1-1.5(2) dm long, mostly about (9)15-29-foliolate with sparsely short-pubescent rachis. Leaflets with sparsely short-pubescent and glandular petiolules about 1-2 mm long subtended by a setaceous stipel about 1-1.5 mm long, usually oblong to elliptic, broadly rounded at both ends or occasionally with acute apex, mostly (1)1.5-2.5(3) cm long and (5)8-15(18) mm wide, glabrous above and short-pubescent on the lower surface with the pubescence almost entirely restricted to the veins, midvein conspicuous beneath, the secondary veins usually macroscopically apparent, the smaller veins not apparent, the lower surface with numerous, conspicuous glands, the margin more or less revolute, the midvein



(a)



(b)



(c)



(d)

Fig. 51. *Amarpha Schwerini*. (a) Distribution; (b) Habit sketch; (c) Leaflet; (d) Calyx and fruit.



Fig. 52. *Amorphia cyanostachya*. (a) Distribution; (b) Habit sketch; (c) Leaflet; (d) Calyx and fruit.

exserted for about 0.2-0.4 mm. Inflorescence of 1 to several, clustered, slender racemes about 0.5-1.5(3) dm long and about 8-12 mm thick with numerous flowers attached to the usually puberulent rachis by a pedicel about 0.5-1 mm long and subtended by subulate, caducous, villous-tipped bracts about 3-4.5 mm long. Calyx-tube turbinate, about 2-2.5 mm high, glabrous or nearly so, with 1-2 rows of reddish glands in upper half, calyx-lobes unequal, densely short-ciliate and occasionally somewhat pubescent on outer surface, the uppermost deltoid, acute or obtuse, about 0.6 mm long, the laterals triangular, acuminate, about 0.8 mm long, the lowermost lobe narrowly subulate, about 1 mm long. Petal usually bright bluish-violet, broadly cuneate-obovate, emarginate, about 4-5 mm long. Legume about 4-6 mm long and 2-2.5 mm wide, dorsally straight or nearly so, ventrally much-rounded, conspicuously glandular-dotted above, glabrous.

DISTRIBUTION: Coastal Plain from North Carolina into Georgia.

4. *AMORPHA GLABRA* Desf. ex Poir. in Lam., Encycl. Meth. Suppl. 1: 330. 1810.

Shrub 1-2 m high, vegetatively glabrous or nearly so. Stipules caducous, subulate, the upper half densely villous, about 3-3.5 mm long. Petioles about 1-3(5) cm long, longer than the width of the lowest leaflet. Leaves mostly 1-2(3) dm long, about 9-21-foliolate. Leaflets with petiolules mostly 2-4(5) mm long, subtended by a setaceous stipel mostly 1-1.5 mm long, oblong, oval or slightly obovate, usually broadly rounded at both ends or barely to conspicuously emarginate at apex and rarely tapering at base, about (1)2-4(6) cm long and about (1)1.5-2.5(3.5) cm wide, glabrous or very nearly so, the lower surface with numerous, conspicuous, reddish-brown, glandular dots; the midvein conspicuous below and the secondary veins macroscopically barely discernible, venation otherwise not apparent, the midvein slightly excurrent up to 1 mm long or more typically ending about flush with the blade and knob-tipped. Inflorescence usually a solitary raceme (or but few together or with 1-3 much smaller racemes near base) about (0.5)1-2 dm long and at anthesis about 1.5-2 cm thick with numerous, rather closely associated flowers attached to the glabrous (or very sparsely puberulent) rachis by pedicels about 1-1.5 mm long and subtended by caducous, subulate bracts about 1-1.5 mm long. Calyx glabrous except for the densely short-pubescent margin of throat, with very small, inconspicuous glands on up-

per half; the tube campanulate, about 2-3 mm high; the lobes very short and broad (or the upper two obsolete) so the margin appears merely undulate, less than 0.5 mm high. Petal bright purple, orbicular-spatulate, mostly (5)6-8 mm long. Legume obliquely obovate, about 7-9 mm long and 3-4.5 mm wide above, dorsally almost straight, ventrally broadly rounded, glabrous throughout but bearing numerous, small glands above.

DISTRIBUTION: Mountains and upper Piedmont region of North and South Carolina, Georgia, Tennessee and Alabama.

A specimen reputedly from Weldon, Halifax County, North Carolina at the Philadelphia Academy of Science is here thought to be mislabeled. The label itself has the locality questioned but whether this query was made by the collector or not is unknown.

5. *AMORPHA FRUTICOSA* L., Sp. Pl. 713. 1753.

A. tennesseensis Shuttleworth, Delect. Sem. Hort. Lips. 1. 1848.

A. fruticosa var. *tennesseensis* (Shuttlew.) E. J. Palmer, Jour. Arn. Arb. 12: 192. 1931.

Shrub about 1.5-4 m high with numerous, finely ribbed, glabrate to finely puberulent branches. Stipules linear, caducous, about 4-5 mm long. Petioles glabrous to short-pubescent, mostly 1-2.5(4) cm long, usually longer than the width of the lowermost leaflet. Leaves mostly (0.5)1-2(3) dm long, about (9)15-35(45)-foliolate with glabrate to densely short-pubescent rachises. Leaflets with short-pubescent petiolules about 1.5-3 mm long subtended by a subulate stipel about 2-4 mm long; its blade oblong, elliptic or occasionally somewhat ovate, usually broadly rounded at both ends, occasionally emarginate, glabrate to short-pubescent above at maturity, glabrate to densely pilose beneath, with numerous, relatively small and inconspicuous, punctate glands below; midvein and secondary veins readily visible; macroscopically the midvein extending from the blade as a slender, tapering mucro about 0.2-0.4 mm long. Racemes usually several in panicle clusters mostly (0.5)1-1.5(2) dm long and about 10-18 mm thick with numerous, densely arranged flowers attached to the densely puberulent or glabrate rachis by pedicels about 1-2 mm long and subtended by linear bracts about 3-4 mm long. Calyx very sparsely to very densely puberulent in bud, puberulent to glabrate at anthesis except for the densely short-ciliate margins of the lobes; the tube



Fig. 53. *Amorpha glabra*. (a) Distribution; (b) Habit sketch; (c) Leaflet; (d) Calyx and fruit.

about 2-3 mm long, turbinate, with few, small and inconspicuous, punctate glands above; the lobes very minute, the lowermost acute to acuminate, about 0.5-1 mm long, the 2 uppermost often broadly rounded. Petal obovate, cuneate, emarginate, about 5-6 mm long, purplish (or purplish-blue to white). Legume mostly 6-9 mm long and about 2-3 mm wide, dorsally curved inward, ventrally outwardly rounded, glabrous, conspicuously glandular-dotted.

DISTRIBUTION: Widespread in the eastern United States from southern Pennsylvania south to northern Florida and westward.

Numerous varieties (sometimes considered species) have been described. Within our area var. *tennesseensis* (Shuttlew.) Palmer (= *A. tennesseensis*) has been recognized (Gonzales Mas 1952, unpublished thesis, N. C. State College) and thought by him to be even more common than the typical element even in the Coastal Plain. Fernald (1950) and Gleason (1952) restrict the range of var. *tennesseensis* to the west of the mountains of North Carolina as did Palmer (1931). Additional study of the variation centered about *A. fruticosa* is needed but for the present at least the apparent absence of even relatively stable morphological distinctions or geographical range make it inadvisable to recognize more than one highly variable entity within our area. It seems to me improbable that the numerous formally named varieties and forms recognized as making up this species can be distinguished except on highly subjective criteria.

A. Curtissii Rydb. (N. Am. Fl. 24: 30. 1919) was attributed to North Carolina by both Palmer (1931) and Small (1933) but both clearly indicated with a question mark the uncertainty which surrounded the identity of the supposed North Carolina record. The distinctness and limits of the postulated species centering about *A. fruticosa* are at present very difficult to determine and will remain so until a much-needed revision is completed. Until then I am treating the entire highly variable complex as *Amorpha fruticosa*.

18. *PSORALEA* L., Sp. Pl. 762. 1753; Gen. Pl. ed. 5. 336 (as *Psoralia*). 1754.

Orbexilum Raf., Atl. Jour. 145. 1832.

Pedimelum Rydb., N. Am. Fl. 24(1): 17. 1919.

Rhytidomene Rydb., N. Am. Fl. 24(1): 12. 1919.

Erect perennial herbs from rhizomes or thickened roots (or more rarely subshrubs or shrubs) and often covered more or less throughout with numerous glands. Stipules lanceolate to linear or setaceous, usually persistent. Leaves odd-pinnately or palmately compound, 1-7-foliolate. Flowers borne in axillary, usually long-peduncled racemes or occasionally spikes. Calyx-tube campanulate, sometimes gibbose or oblique; the lobes equal or usually unequal with the lowermost lobe the longest. Corolla papilionaceous, petals 5, attached at base of calyx-tube, standard obovate to rotund, usually clawed, wings about equaling (or sometimes exceeding) the standard and longer than the keel-petals. Stamens 10 (or rarely 9), diadelphous or the tenth stamen partly united and then weakly monadelphous, anthers equal and uniform or in some species the alternate anthers smaller. Ovary sessile or stipitate, 1-ovuled. Legume short, usually not much exceeding the calyx, usually flattened or occasionally turgid, often conspicuously wrinkled, indehiscent or irregularly dehiscent, 1-seeded, often terminated by the persistent style.

A genus of perhaps 150 species principally of Africa, Australia and western North America extending into South America. (Name derived from the Greek *Psoraleos* = scurfy, alluding to the punctate glands.)

1. Leaves 5-7-foliolate, leaflets filiform, never more than 3 mm wide 1. *P. Lupinellus*.
1. Leaves 1-3-foliolate, leaflets mostly ovate, elliptic or lanceolate, never filiform, mostly much wider than 5 mm.
2. Leaves pinnately 3-foliolate, the rachis-stalk of the terminal leaflet usually elongate; leaflets glabrous or short-pubescent, usually 2-times or more as long as wide; petioles of the median and lower leaves 1-8 cm long, much longer than the petioles; legume indehiscent.
3. Plants rhizomatous; leaves broadly ovate to ovate-lanceolate, mostly (2)3 cm or more wide.

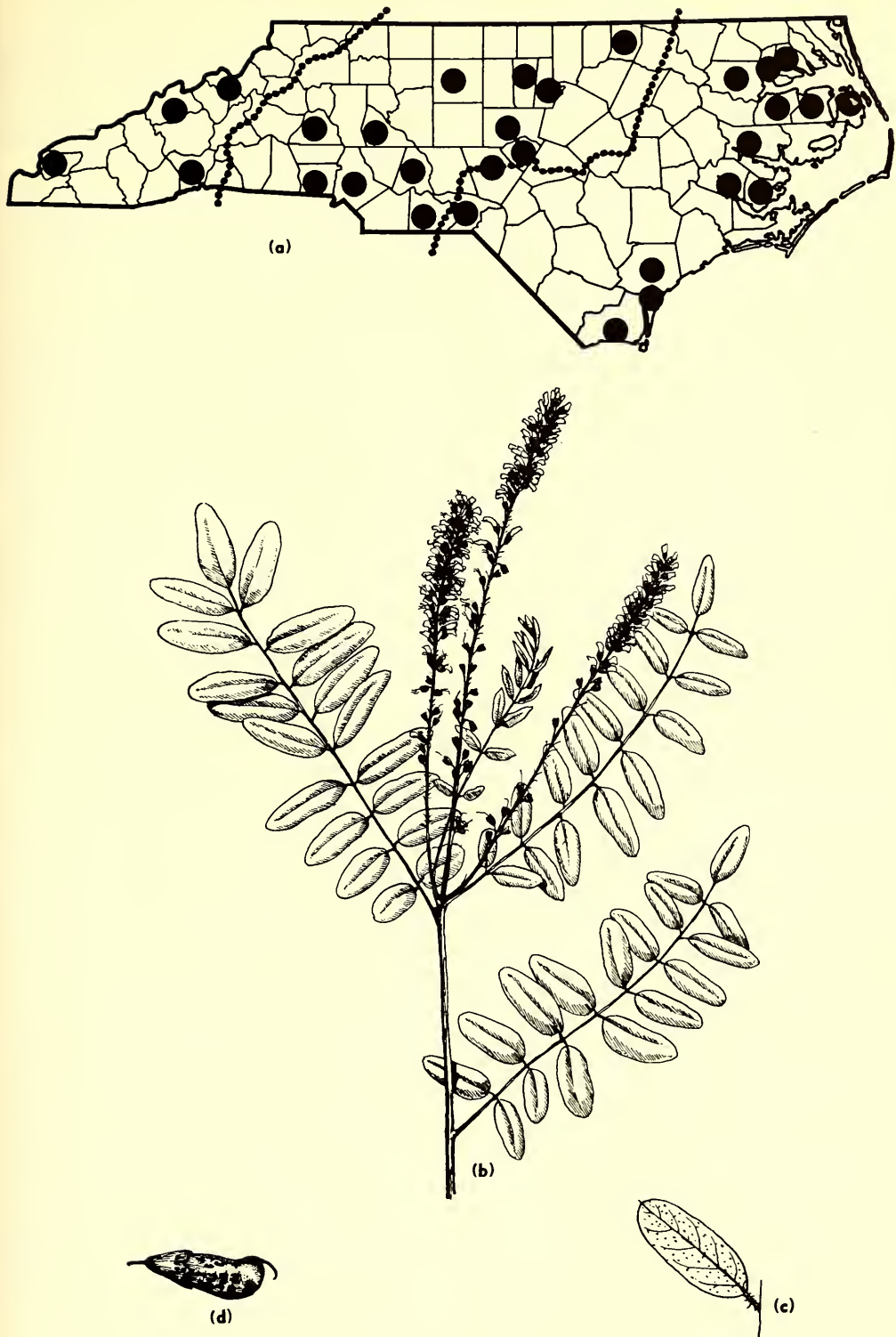


Fig. 54. *Amorphia fruticosa*. (a) Distribution; (b) Habit sketch; (c) Leaflet; (d) Calyx and fruit.

4. Leaflets cordate at base, obtuse at apex, noticeably glandular-punctate on both surfaces to the unaided eye; petals 8-9.5 mm long; calyx and rachis with short-stalked glands; calyx-lobes about 2-3 mm long 2. *P. macrophylla*.
 4. Leaflets broadly rounded at base, acute to acuminate at the apex, very inconspicuously glandular-punctate above but eglandular beneath; petals about 5.5-7 mm long; calyx and rachis eglandular; calyx-lobes less than 1.2 mm long 3. *P. Onobrychis*.
 3. Plants with a fusiform taproot; leaves narrowly oblong, elliptic or lanceolate, 2 cm or less in width .. 4. *P. psoralioides*.
 2. Leaves palmately 3-foliolate (or the upper leaves sometimes 1-foliolate), leaflets only petiolulate; leaflets conspicuously and densely appressed-hirsute beneath, usually less than 2-times as long as wide; petioles of the median and lower leaves usually less than 1 cm long, often exceeded or nearly equaled by the petiolules; legume irregularly dehiscent .. 5. *P. canescens*.
1. PSORALEA LUPINELLUS Michx.,
Fl. Bor. Am. 2: 58. 1803.
Rhytidomene Lupinellus (Michx.) Rydb., N.
Am. Fl. 24(1): 12. 1919.
Perennial herb from slender, elongate creeping rhizome about 2-3 mm in diameter with ascendent to erect, aerial, clustered stems about 2-6 dm high and short-pubescent to glabrate throughout. Stipules linear to setaceous, mostly 2-4 mm long. Petioles about (0.5)1-3(4) cm long. Leaves palmately 5-7-foliolate. Leaflets linear-filiform, mostly 2-6(8) cm long, about 0.5-1(1.5) mm wide, 1-nerved, commonly involute, glandular-punctate, sparsely short-pubescent and with petiolules about 0.5 mm long. Racemes axillary, lax, loosely few-flowered and fruited, mostly 2-5 cm long on peduncles about 4-8 cm long with small flowers about 6 mm long on short-pubescent pedicels about 1-2 mm long subtended by a caducous, punctate-glandular, sparsely short-pubescent, triangular bract about 2 mm long. Calyx sparsely short-pubescent, glandular-punctate, enlarging in fruit; tube about 1-1.5 mm high, broadly campanulate; uppermost lobes ovate to oblong-ovate, obtuse to acute, about 0.8-1 mm long, lateral lobes somewhat longer, deltoid, acute, the lowermost lobe lanceolate, acute and about 1.5 mm long. Petals blue or violet, standard about 4-5.6 mm long, sub-orbicular with a short claw, the wings somewhat longer. Legume crescent-shaped, obliquely cross-wrinkled, about 1 cm long, glandular-punctate, indehiscent.
 2. PSORALEA MACROPHYLLA Rowlee
ex Small; Fl. SE. US. 623. 1903.
Orbexilum macrophyllum (Small) Rydb., N.
Am. Fl. 24(1): 5: 1919.
Perennial herb with an erect, stout, prominently angled and conspicuously ridged and grooved, retrorsely short-pubescent or puberulent stem of about 0.5-1 m high. Stipules narrowly linear and subulate, about 0.8-1.2 cm long or more, striate and densely short-pubescent or puberulent. Petioles about (3)6-8 cm long or even longer, striate and usually densely but inconspicuously retrorsely pubescent. Leaves pinnately 3-foliolate and with the rachis-stalk of the terminal leaflet about 1.5-2 cm long; the petiolules about 3-4 mm long and densely short-pubescent or puberulent; the leaflets broadly ovate in general outline, about 6-8 cm long and 4-7 cm wide, with an obtuse or even rounded apex and a subcordate or more typically conspicuously cordate base; finely puberulent or short-pubescent on the veins beneath but otherwise glabrous or very nearly so above and below, noticeably glandular-punctate both above and below to the unaided eye but more conspicuously so above, venation finely reticulate. Inflorescence of few to several terminal and axillary racemes about 2-3 dm long with peduncles about 0.6-2 dm long and striate, densely short-pubescent or puberulent rachises mostly 8-15 cm long which above possess few to numerous, inconspicuous, short-stalked glands; the flowers attached solitarily or loosely-arranged in subverticillate clusters of 2-4 on short-pubescent pedicels 1-3(4) mm long subtended by a caducous bract. Flowers about 8-9.5 mm long with a densely short-pubescent calyx sparingly to moderately beset with short-stalked glandular hairs; the tube about 2 mm long; the lobes lanceolate and acute to acuminate, the upper and lateral about 2-2.5 mm long and the lowermost about 3 mm long. Petals reputedly purple; the standard broadly obovate to orbicular; the wings and keel-petals clawed, lunate in outline and obtuse. Fruit unknown.
 - DISTRIBUTION: Coastal Plain of North Carolina to Central Florida.
 - DISTRIBUTION: Known only from the type-locality on Tryon Mt., Polk County, North Carolina, where it was collected for the first and apparently only time more than sixty years ago (1897).



Fig. 55. *Psoralea Lupinellus*. (a) Distribution; (b) Habit sketch; (c) Leaf; (d) Fruit.

This plant is a most well-defined species and amply distinct for all known eastern members of the genus. It perhaps is most closely related to *P. Onobrychis* Nutt. from which it can be easily distinguished by both the conspicuously cordate base of its leaflets and the short-stalked glands on both the rachis and calyx.

3. PSORALEA ONOBRYCHIS Nutt.,
Gen. 2: 104. 1818.

Orbexilum Onobrychis (Nutt.) Rydb. 24(1): 5. 1919.

Perennial herb from a rhizomatous rootstock and with an erect, moderately stout, conspicuously striate or ridged and grooved, sparsely (or above moderately) appressed short-pubescent stem mostly 1-1.5 m high. Stipules subulate to almost setaceous, appressed short-pubescent, about 5-8(10) mm long. Petioles about (3)4-7(8) cm long, conspicuously grooved above and strongly striate and angled, glabrous or very sparingly short-pubescent. Leaves pinnately 3-foliolate with the rachis-stalk of the terminal leaflet about 1-2(2.5) cm long; the petiolules about 2.5-5 mm long and moderately to densely short-pubescent or puberulent; the leaflets ovate-lanceolate to lanceolate, about (5)6-9(11) cm long and (2)3-5(6) cm wide, with an acute to acuminate or even taper-tipped apex and a broadly rounded base, usually appressed short-pubescent beneath along the veins but occasionally glabrous or very nearly so beneath, glabrous above or less commonly sparingly pubescent, very inconspicuously glandular-punctate above but eglandular beneath, venation very inconspicuously reticulate. Inflorescences usually several to numerous from the axils of the upper leaves but also terminal, mostly 1-3.5 dm long with an elongate, sparingly to moderately short-pubescent, striate peduncle mostly about 5-15 cm long and a moderately to densely short-pubescent rachis of about 5-10 (20) cm long with loosely to compactly arranged flowers borne on rather short-pubescent pedicels about 1-2.5 mm long subtended by caducous, subulate sparingly short-pubescent bracts of about 2-4 mm long. Flowers about 5.5-7 mm long with a glabrous or appressed short-pubescent calyx; the tube about 1.2-2 mm long; the lobes about 0.2-0.8 mm long and acute to obtuse. Petals bluish and the keel purple-tipped; the standard suborbicular to obovate; the wing-petals exceeding the keel but both somewhat lunate-oblong and slender-clawed. Fruit indehiscent, obliquely ovate, flattened, transversely corrugated and sometimes warty, about 8-10 mm long.

DISTRIBUTION: Rich wooded areas from Ohio westward into Illinois and south into eastern Missouri and Tennessee and apparently sporadically into both of the Carolinas.

4. PSORALEA PSORALIOIDES (Walt.)
Cory, Rhodora 38: 404. 1936.

Orbexilum pedunculatum (Mill.) Rydb., N. Am. Fl. 24(1): 7. 1919.

Perennial herb from a fusiform taproot, usually branching from the base with glabrous or sparingly strigose, slender stems about 3-9 dm high, sparingly branched above. Stipules about 4-6 mm long, linear-subulate, persistent or tardily deciduous. Petioles of the lower and median leaves about 1-4(6) cm long, those of the upper leaves very short, sub-sessile or commonly about 2-8 mm long. Leaves 3-foliolate, the leaflets narrowly oblong, elliptic or lanceolate, about 3-5(7) cm long and 5-10(15) mm wide, gradually tapering to an obtuse to acute, usually apiculate tip, glabrous to sparingly pubescent, densely punctate glandular on both surfaces to almost glandless. Racemes terminal or axillary, slender, appearing almost spike-like, mostly densely flowered and 2-5 cm long but loosening by elongation and then up to about 10 cm long on elongate, slender peduncles mostly 4-15 cm long and much exceeding the subtending leaves. Flowers about 6-7 mm long on pedicels about 1 mm long subtended in pairs by a deciduous or caducous bract of about 5-10 mm long. Calyx more or less pubescent, the tube campanulate, about 1.5-2 mm long, the dorsal and lateral lobes triangular, acute, about 1-3 mm long, about equaling the tube; ventral lobe linear, acuminate, about 1.5-3.5 mm long, longer than the tube and the other lobes. Legume orbicular, flat, about 4-5 mm long, strongly transversely corrugate, indehiscent.

1. Floral bracts, calyces and leaflets conspicuously glandular-dotted; bracts suborbicular to broadly ovate, 6-10 mm long, 2-5 mm wide with an abruptly caudate tip 3-5 mm long; calyx 3-5 mm long, the dorsal and lateral lobes 1-2 mm long, the ventral 1.6-2.6 mm long; leaflets 4-5-times longer than broad var. *psoralioides*.

1. Floral bracts, calyces and leaflets eglandular or with relatively fewer punctate glands; bract ovate-acuminate, 5-8 mm long, 1.3-2.4 mm wide with gradually acuminate tip; calyx 3-6 mm long, the dorsal and lateral lobes 2-3 mm long, the ventral 2.4-3.8 mm long, leaflets 4-7 times longer than broad var. *eglandulosa*.

P. PSORALIOIDES var. PSORALIOIDES.

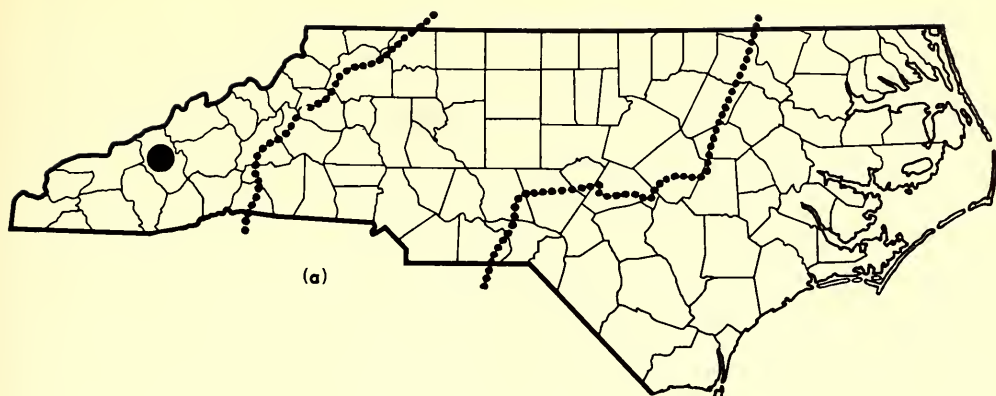


Fig. 56. *Psoralea Onobrychis*. (a) Distribution; (b) Habit sketch.

DISTRIBUTION: Coastal Plain (and at least in North Carolina also the lower Piedmont) from southeastern Virginia into northern Florida.

P. PSORALIOIDES var. EGLANDULOSA (Ell.) F. L. Freeman, *Rhodora* 39: 426. 1937.

DISTRIBUTION: Upper Piedmont and mountains from North and South Carolina south into Georgia and west into Texas and north into southeastern Kansas, Missouri, Illinois, Indiana, and Ohio.

These two varieties of SAMPSON'S SNAKEROOT seem most distinct within North Carolina and also throughout their ranges. However, I am unable to distinguish the supposedly Georgian and Floridian var. *gracilis* (Chapm. ex T. & G.) Freeman (1937, p. 427) from var. *psoralioides*. Fernald (1950) included Virginia within the range of the eglandular variety. Virginian representatives were certainly not to be seen among the hundreds of specimens examined by me, and several of Fernald's identifications of Virginian plants as this variety were definitely in error. Gleason (1952, p. 407) wrote that the two varieties south of the area treated in the Illustrated Flora geographically "overlap and also tend somewhat to integrate." I have seen but little evidence of this supposed blending or blurring of the distinctions and this only in a small area in South Carolina where their ranges slightly overlap.

5. PSORALEA CANESCENS Michx., Fl. Bor. Am. 2: 57. 1803.

Pedimelum canescens (Michx.) Rydb., N. Am. Fl. 24(1): 18. 1919.

Perennial herb from a subglobose or fusiform, tuberous root with stout, stems about 0.3-1 m high with numerous, divergent branches forming a bushy crown and coarsely canescent throughout. Stipules linear to subulate, about 4-10 mm long, attached basally to the petiole. Petiole short or even subsessile above, about 2-10 mm long, usually shorter than the petiolules. Leaves palmately 3-foliolate or the uppermost sometimes 1-foliolate; leaflets elliptic to obovate, mostly (1.5)2-4(6) cm long and about 1-3 cm wide, broadly rounded at the apex but minutely apiculate, densely but inconspicuously glandular-punctate on both surfaces, glabrate above, densely appressed-

hirsute beneath, tapering to base with densely appressed pubescent petiolules usually longer than the petiole, mostly about 4-8 mm long. Racemes axillary, loosely few-flowered, about 2-6 cm long on peduncles about 2-7 cm long with flowers about 10-12 mm long on short-pubescent pedicels 3-6 mm long subtended by an ovate, persistent or tardily deciduous bracts about 4-6 mm long. Calyx appressed to spreading villous, inconspicuously glandular-punctate; tube about 3-4 mm high, strikingly gibbous on the upper side; the lobes unequal, the 4 uppermost about equal, acute, oblong-lanceolate, 3-4 mm long; the lowermost 5-7 mm long, lanceolate, acuminate. Petals 8-12 mm long, blue or violet often changing to green upon drying. Legume about 1 cm long, oval, compressed with a broad, straight beak, dehiscent.

DISTRIBUTION: Coastal Plain from southeastern Virginia to Florida and Alabama.

19. PETALOSTEMUM Michx., Fl. Bor. Am. 2: 48. 1803. *nom. conserv.* (as *Petalostemon*)

Kuhnistera Lam., *Encyc. Méth.* 3: 370. 1791.

Erect perennial or rarely annual herbs often branched at the base with minute stipules and odd-pinnately compound, glandular-dotted leaves and entire leaflets. Inflorescence a terminal, usually densely flowered spike with the individual flowers subtended by deciduous bracts but occasionally in head-like spikes surrounded by 3 to 4 rows of large, broadly ovate, persistent, sterile, involucre bracts. Calyx-tube sessile, turbinate to campanulate, sharply 10-nerved with 5, triangular to lanceolate or filiform-subulate lobes equaling one another or nearly so. Corolla but vaguely papilionaceous to almost regular, white, pink, purple or yellow; the standard free and attached at the base of the calyx; the other petals (because of their probable origin often interpreted as petaloid staminodes) inserted at the top of the staminal column. Stamens monadelphous, the filament united for about one-half to four-fifths their length, 5 in number. Ovary sessile, 2-ovuled. Legume membranous, 1-seeded, enclosed by calyx, somewhat compressed, obliquely obovate to semi-obicular, indehiscent.

A North American genus of about 40-50 species principally of the South and Southwest. (Name derived from the Greek *petalon* = petal and *stemon* = stamen, in reference to the four petals (or petaloid staminodes) attached to the top of the staminal tube.)

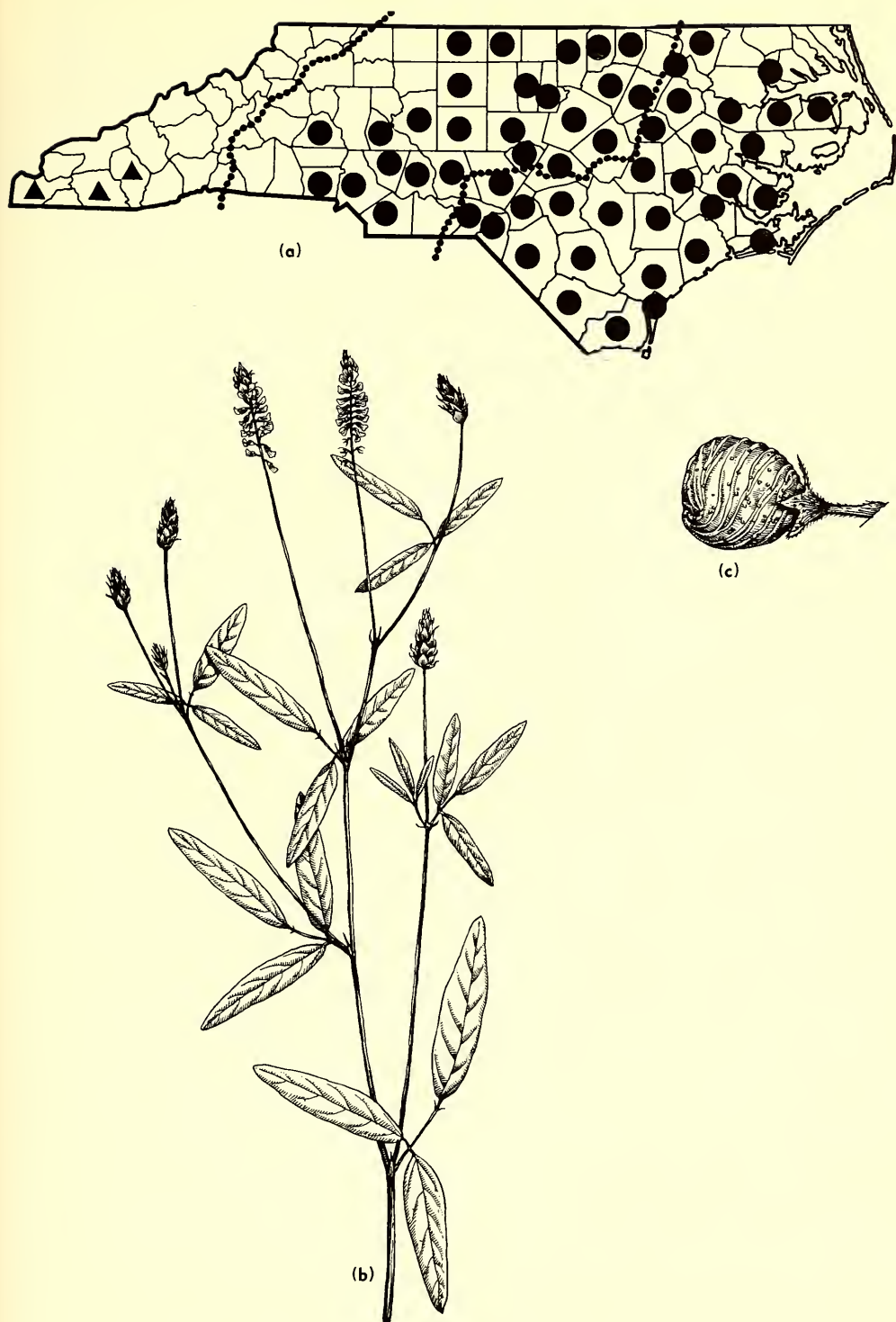


Fig. 57. *Psoralea psoralioides*. (a) Distribution (dots indicate *P. psoralioides* val. *psoralioides* and triangles indicate *P. psoralioides* var. *eglandulosa*); (b) Habit sketch; (c) Calyx and fruit.

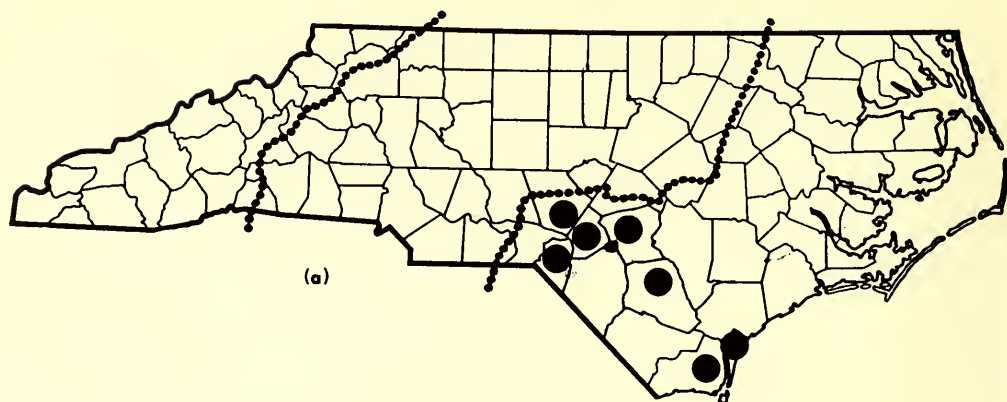


Fig. 58. *Psoralea canescens*. (a) Distribution; (b) Habit sketch.

I have chosen to employ the original spelling of this name as would seem only proper under Article 73. Rickett and Stafleu (Taxon 8:293.1959) unfortunately have given no reason why the alternative spelling *Petalostemon*, first utilized by Persoon in 1806, was chosen for conservation while Michaux's own *Petalostemum* was listed in the column of *nomina rejicienda*.

1. *PETALOSTEMUM PINNATUM*
(Walt. ex J. F. Gmel.) Blake, Rhodora
17: 131. 1915.

Kuhnistera pinnata (Walt. ex J. F. Gmel.)
Kuntze, Rev. Gen. 192. 1891.

Perennial herb arising from a taproot with solitary or more usually caespitously clustered, terete, finely striate, glabrous but punctate-glandular stems about (3)4-6(11) dm high, usually abundantly corymbosely branched above with the finer stems becoming angulate. Stipules minute, subulate-setaceous, about 0.8-1.2 mm long. Petioles about 2-4 mm long. Leaves about 1-2 cm long, 3-11-foliolate, leaflets linear-filiform, about 5-8(12) mm long, glabrous, minutely punctate-glandular, terete or more or less tetragonal in cross-section, about 0.2-0.4 mm thick with petiolules about 0.1 mm long attached to the quadrate, glandular rachis. Flowers sessile in corymbosely arranged, terminal, head-like, involucrate spikes about 8-12 mm long and only slightly narrower. Involucrate outer bracts purplish-brown, broadly ovate to orbicular, glabrous except for densely short-ciliate margin, about 3-7 mm long, imbricate; the inner, fertile, subtending bracts oblong, about 4-7 mm long and 1 mm wide. Calyx-tube densely villous, turbinate, 10-ribbed, about 1.5-2 mm long in flower, but persisting and enlarging in fruit up to about 2.5 mm long; calyx-lobes filiform-subulate, plumose, about 3-4 mm long in flower, elongating in fruit up to about 5-6 mm long. Corolla regular or nearly so, white, about 6-8 mm long, the standard attached at the base of the calyx, the other four petals (probably better considered as petaloid staminodes) attached at the top of the monadelphous staminal tube. Stamens 5. Legume obovoid, about 2-2.5 mm long, villous-pubescent at least above and about equaling the calyx-tube in length.

DISTRIBUTION: The Coastal Plain from North Carolina south as far as central Florida and west into Mississippi.

20. *AESCHYNOMENE* L., Sp. Pl. 713.
1753; Gen. Pl. ed. 5. 319. 1754.

Prostrate to erect, annual or perennial herbs, shrubs or small trees with odd- or even-pinnately compound leaves with usually numerous leaflets (but ranging from 5-80 in number) which are typically small, entire, deticulate or serrulate and sensitive to light and usually to touch. Stipules usually soon deciduous or less commonly persistent, membranous to foliaceous, peltate (i.e. with a lobe extending below the point of attachment) or basally attached (and then appendage lacking). Petioles usually about as long as the leaflets. Inflorescences axillary and sometimes also terminal (flowers rarely solitary) with usually few to several, pedicellate flowers borne in raceme-like or less commonly paniculate clusters subtended by a bract resembling the stipules and with a pair of bractlets closely appressed beneath the calyx. Calyx usually persistent, either 2-lipped with the upper lip entire to 2-cleft and the lower lip entire to 3-parted or campanulate with subequal lobes. Corolla papilionaceous, yellowish to red or purple, or even white; petals usually clawed; the standard suborbicular to reniform, the wings obliquely obovate and 1-auricled and about as long as the standard, the keel moderately curved to sharply bent. Stamens basically diadelphous in 2 groups of 5 each but the sheath sometimes tardily splitting. Ovary sessile to short-stipitate. Fruit linear, laterally compressed, subsessile to long-stipitate, composed of (1)2-many segments forming a disarticulating loment of 1-seeded, indehiscent or dehiscent joints.

A genus of perhaps 100 species of the tropics and temperate regions of both hemispheres. (Name derived from the Greek for "ashamed," an allusion to the sensitive response or "shrinking from touch" of the leaflets of many species.)

Only one species was known from North Carolina to Fernald (Rhodora 41: 467. 1939) and Rudd (1955) as *Ae. virginica* was unreported south of Virginia. However, several stations for this species are now known from the Carolinas.

1. Fruiting stipe 1.2 cm long or longer; leaflets mostly 1 cm long or longer; bractlets subtending the calyx about 4 mm long and 2-3 mm wide with toothed margins; flowers usually more than 1 cm long 1. *Ae. virginica*.

1. Fruiting stipe at most 1 cm long and usually less; leaflets mostly less than 1 cm long;



Fig. 59. *Petalostemum pinnatum*. (a) Distribution; (b) Habit sketch; (c) Flower cluster showing involucral bracts.

bractlets subtending the calyx usually less than 4 mm long and about 1 mm wide and with entire or nearly entire margins; flowers mostly less than 1 cm long 2. *Ae. indica*.

1. *AESCHYNOMENE VIRGINICA* (L.) B.S.P., Prelim. Cat. N. Y. Pl. 13. 1888.

Erect, often robust, annual herb usually bushy-branched and mostly (0.3)0.5-1.2(3) m high with terete, finely striate stems glabrous or at least glabrate below and usually sparsely to moderately glandular-pubescent above with hairs with swollen bases. Stipules peltately attached with a basal appendage extending below the point of attachment, membranous, deciduous, lanceolate, both upper and lower lobes acute, entire to minutely toothed (the teeth tipped with a short-excurrent hair) about 0.8-1.2(1.5) cm long including the usually 2-5 mm long basal, triangular lobe. Petiole short, usually about as long as a leaflet, mostly (0.8)1-2(2.5) cm long, usually sparingly hispid. Leaves even-pinnately compound, about (2)5-12 cm long with numerous, 30-56, sensitive, overlapping when folded, 1-nerved, slightly inequilateral, glabrous, entire, more or less oblong or linear-oblong leaflets usually about (8)10-20(25) mm long and 2-3 mm wide with a slightly mucronulate, broadly rounded to obtuse apex and a more or less obliquely rounded base and with very short, pulvinate petiolules and usually a somewhat glandular-pubescent rachis with basally swollen trichomes. Racemes axillary, slender, mostly 2-6 cm long, with a glandular-pubescent rachis often bearing a small leaf of about 1-3 cm long at the lowermost node or about 1-2 cm from the axil, but above each node bearing an ovate to elliptic, cordate, toothed, acuminate bract about 6 mm long and 2-3 mm wide subtending the usually sparingly glandular-pubescent pedicel of about 3-8 mm long bearing a pair of ovate to ovate-lanceolate, somewhat toothed bractlets about 4 mm long and 2-3 mm wide near or just beneath the calyx. Calyx strikingly 2-lipped, glabrous: the tube about 1.7-2 mm high; the upper lip about 3-4 mm long with 2 bluntly triangular, free lobes about 0.5 mm long; the lower lip about 4-5.5 mm long with 3 free, triangular lobes of about 0.4-0.6 mm long. Petals yellowish to reddish-purple; the standard 10-15 mm long, its blade orbicular or nearly so. Legume oblong-linear, laterally compressed, mostly 3-6 cm long and 5-7 mm wide on a glabrous to hispid stipe about 1.2-2(2.5) cm long with (3)6-9(10) disarticulating segments.

DISTRIBUTION: Banks and tidal marshes from New Jersey south into

North Carolina; also known from southeastern South Carolina (Jasper Co.—*Ahles* 18155.)

Fernald (*Rhodora* 41: 461-466. 1939) concluded that *Aeschynomene virginica* was to be found no further south than Virginia. Rudd (1955, pp. 56-58) in her monograph also thought Virginia to be the southernmost state in which this species occurred. However, it is now known from three stations in Craven County (approximately half way down the North Carolina coast). One of these was kindly confirmed by Dr. Rudd. In addition there is a specimen of this species so annotated by Dr. Rudd in the herbarium of the N. Y. Botanical Garden collected by Croom and simply labeled "Lenoir County?" This specimen probably represents the first collection of *Ae. virginica* from the area and one which was made well over one-hundred years ago. The species has recently been found in southeastern South Carolina.

2. *AESCHYNOMENE INDICA* L., Sp. Pl. 713. 1753.

Aeschynomene virginica in sense of Small, Man. SE. Fl. 727. 1933.

Erect, usually more or less robust, often bushy-branched annual herb about (0.2)0.5-1(2.5) m high with finely striate stems, glabrous or glabrate below and glandular-pubescent above with hairs with swollen bases. Stipules peltately attached, caudate-appendiculate, extending below the point of attachment, membranous, deciduous, lanceolate and acuminate above but more or less rounded below, entire or irregularly sparsely toothed, about 0.6-1.2(1.5) cm long including the 2-4 mm long basal, triangular lobe. Petiole short, usually about as long as the leaflets, mostly 5-8(10) mm long. Leaves even-pinnately compound, about (2)5-12 cm long, with numerous, mostly about 50-70, sensitive, overlapping when folded, 1-nerved, slightly inequilateral, glabrous, more or less oblong or linear-oblong leaflets mostly about (3)5-8(10) mm long and 0.8-2.5 mm wide with a mucronulate, broadly rounded or obtuse apex and an obliquely rounded base, with very short petiolules about 0.1-0.2 mm long and a glandular-pubescent rachis with hairs swollen at base. Racemes axillary, slender, mostly about 2-6(10) cm long with more or less glandular-pubescent rachises, peduncles and pedicels and usually with a small leaf about 1-2.5 cm long at the lowermost node about (0.5)0.8-



Fig. 60. *Aeschynomene virginica* and *Ae. indica*. (a) Distribution of *Ae. virginica*; (b) Habit sketch of *Ae. virginica*; (c) Calyx and bracts of *Ae. virginica*; (d) Fruit of *Ae. virginica*; (e) Distribution of *Ae. indica*; (f) Calyx and bracts of *Ae. indica*; (g) Fruit of *Ae. indica*.

1.2(2) cm from the axil but above, the few-several (about 1-4) nodes each bearing a minutely toothed, ovate to elliptic bract about 3-5 mm long subtending the glabrous to sparingly hispidulous pedicel about 2-5 mm long with a pair of ovate to lanceolate-ovate, entire or nearly so, acute bractlets about 2-4 mm long just beneath the calyx. Calyx glabrous, strikingly 2-lipped, the tube about 2 mm high, the upper lip about 4-5 mm long and with 2 bluntly triangular, free lobes about 0.5 mm long, the lower lip about 5-6 mm long with 3 free, triangular lobes about 0.6-0.8 mm long. Petals yellowish to reddish-purple, the standard 8-10 mm long. Legume oblong-linear, compressed, about 2-5 cm long, with stipe about 3-8(10) mm long, more or less smooth and glabrous at maturity or sparsely hispid with (3)5-10(12) disarticulating segments.

DISTRIBUTION: Coastal North Carolina south through Florida and west into Texas and also apparently introduced into Puerto Rico, coastal Asia, islands of the Pacific, Australia and Africa.

21. *CORONILLA* L., Sp. Pl. 742. 1753;
Gen. Pl. ed. 5. 330. 1754.

Glabrous or sometimes silky-pubescent annual or perennial herbs or even low shrubs with odd-pinnately compound leaves (or in some species 1- or 3-foliate) with usually 3-12 pair of rather small, bluish-green, entire leaflets. Stipules either small and membranous or large and leaf-like. Inflorescence an axillary, long-peduncled umbel with few to numerous pedicellate flowers usually subtended by small, inconspicuous bracts but lacking bractlets. Calyx-tube shortly campanulate, the lobes small, the upper 2 more or less united into a lip, the lower lobes separate. Corolla papilionaceous, the petals yellow, reddish or white, long-clawed; the standard orbicular, wings ovate-oblong, the keel incurved. Stamens diadelphous, 9 and 1. Ovary sessile. Legume straight or weakly curved, terete, 4-angled or weakly winged, transversely jointed, with 1-seeded, disarticulating oblong segments.

A genus of about 20 species of Europe, Asia and North Africa. (Name a diminutive of the Latin *corona* = a crown, an allusion to the inflorescence.)

1. *CORONILLA VARIA* L., Sp. Pl. 743. 1753.

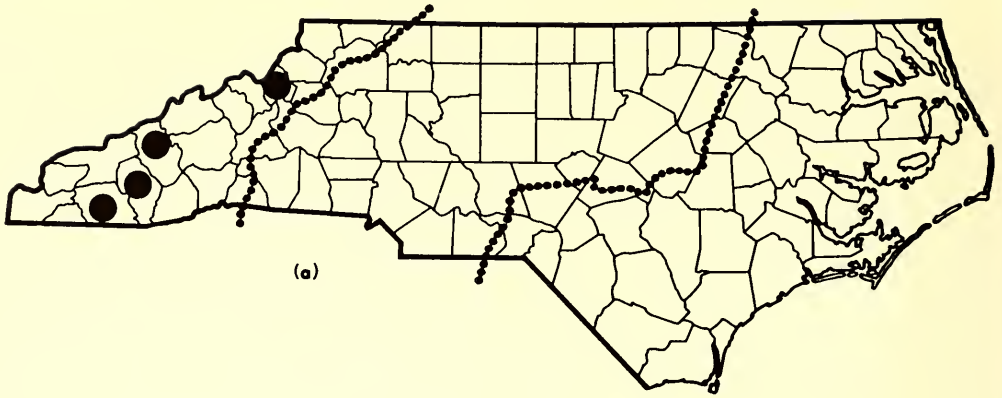
Perennial herb arising from a thick, branching rhizome with trailing to ascendent or weakly climbing stems about 3-5 (12) dm long,

glabrous or occasionally very sparsely pubescent. Stipules membranous, small, about 2-3 mm long, linear-oblong or linear-lanceolate to triangular, persisting. Leaves sessile or nearly so, mostly 5-10 cm long, with (9)11-21(25), obovate to oblong leaflets about 1-1.5(2) cm long and about $\frac{1}{4}$ - $\frac{1}{2}$ as wide, mucronulate and broadly rounded, obtuse, truncate or retuse at apex and broadly rounded to cuneate at base, with petiolules about 1 mm long. Umbellate-clusters on peduncles about 5-12(15) cm long, usually exceeding the subtending leaf and with (5)10-15(20) flowers on slender, at first nodding, but later becoming erect, pedicels of about 3-4(7) mm long and each subtended by a linear, scale-like bract about 0.5-1 mm long. Calyx glabrous, the tube broadly campanulate to turbinate, about 1 mm high, the lobes minute, those of the upper lip almost completely united but free for about the upper 0.1-0.2 mm, very acute, the lower 3 triangular-subulate, about 0.6-1 mm long. Petals mostly pink or rose, their claws up to 2-times as long as the calyx-tube, about 1-1.5 cm long; the standard mostly dark rose or lilac, slightly shorter than the often whitish wings and the curved, long-beaked, purple-tipped keel. Legume linear, 4-angled, about (1.5)3-4(5.5) cm long and 2 mm wide with the elongate style usually remaining persistent and with 3-7 segments each about 6-8 mm long.

DISTRIBUTION: The CROWN-VETCH is apparently native to Eurasia and Africa but in this country has been cultivated from Maine to South Dakota and south into Missouri and North Carolina and has escaped.

22. *ZORNIA* Gmel., Syst. Nat. ed. 13. 2: 1096. 1791.

Perennial herbs or semi-shrubs with palmately compound, 2-4-foliate leaves. Leaflets entire, petiolulate, estipellate and often with translucent punctate glands. Stipules foliaceous, free from the petiole. Flowers solitary or in terminal or axillary, interrupted spikes, sessile or shortly pedicellate and each subtended and more or less completely enveloped by a pair of modified stipular bracts; bractlets lacking. Calyx irregular, tube campanulate or turbinate; the upper lobes almost completely united, the lateral much shorter and the lowermost lanceolate and nearly as long as the upper lip. Corolla papilionaceous, yellowish; the standard suborbicular or broadly obovate, much exceeding the other petals; the wings obovate to oblong, short-clawed and minutely auricled; the keel obtuse or somewhat beaked, curved. Stamens monadelphous



(a)



(b)

(c)

Fig. 61. *Cornilla varia*. (a) Distribution; (b) Habit sketch; (c) Fruit.

with alternating oblong and globose anthers. Ovary sessile; style slender with a small terminal stigma. Legume flattened, oblong, with an almost straight upper and a deeply indented lower suture and with several, indehiscent, disarticulating, often bristly, 1-seeded segments.

A genus of about 20 species principally of the American tropics. (Named in commemoration of Johannes Zorn (1739-1799), a German pharmacist.)

1. *ZORNIA BRACTEATA* Walt. ex J. F. Gmel., Syst. Nat. ed. 13. 2: 1096. 1791.

Perennial, prostrate herb from an elongate, woody root with several to numerous, glabrous, much-branched, slender, wiry, trailing stems mostly about 2-6 dm long. Stipules ovate-lanceolate to lanceolate, acute, about 0.5-1.2 cm long, striate, prolonged below the point of attachment into a flap-like, appressed, acute basal lobe about 1-3 mm long. Petioles slender, about 1-3 cm long. Leaves palmately compound, mostly 4-foliolate (or more rarely 2-, 3- or even 1-foliolate); leaflets broadly obovate, oblong, elliptic to linear-lanceolate, mostly 1-3 cm long, mucronulate and broadly rounded to acute at apex, with narrowly to broadly cuneate base and with a petiolule about 1 mm long and usually with inconspicuous, punctate glands and glabrous or appressed short-pubescent along the elevated midvein beneath. Spikes axillary and terminal, mostly (3)5-10(15) cm long and usually much exceeding the subtending leaf with peduncle about 2-7 cm long and bearing about 3-10 subsessile flowers each separated by about 1-2 cm of internode, subtended and largely enveloped by the 2 closely appressed, broadly oval, ovate or obovate, striate, acute to obtuse, ciliate-margined bracts about 0.7-1.5 cm long including the 0.5-3 mm long basal lobe which extends below the point of attachment. Calyx glabrous except for minutely ciliate margin, very thinly membranous; tube campanulate, about 2-2.5 mm high; the upper lobes about 2 mm long almost completely united except for the obtuse free tips about 0.5 mm long, the lateral lobes triangular, acute, about 0.5-0.7 mm long, the lowermost lobe linear-subulate and about 2 mm long. Petals yellow, about 0.9-1.2(1.4) cm long. Legume linear, about 1-2 cm long, composed of 2-4(5), disarticulating, bristly segments about 3-4 mm long and 2.5-3 mm wide.

DISTRIBUTION: Coastal Plain from southeastern Virginia south to Florida and west into Texas and reportedly into Mexico.

23. *ARACHIS* L., Sp. Pl. 741. 1753; Gen. Pl. ed. 5. 329. 1754.

Low, erect or trailing, annual or perennial herbs with usually even-pinnately compound leaves (some species 3-foliolate) and usually 2-pair of entire, estipellate leaflets (rarely with a terminal leaflet but never with a tendril.) Stipules partly united to the petiole, usually conspicuous. Flowers sessile but appearing long-pedicellate from the elongate, filiform hypanthium, usually 3 to several borne in a shortened spicate cluster from the axils of the lower leaves and closely subtended by 1- and 2-lobed, striate bracts. Calyx joined below to the long, slender tube (the hypanthium) resembling a pedicel, conspicuously 2-lipped with the four upper lobes more or less adnate and the lower lobe slender and distinct. Corolla papilionaceous, yellow to whitish, the petals inserted at the top of the hypanthium; the standard suborbicular, short-clawed, wings oblong, usually with a basal auricle and free from the incurved, beaked keel. Stamens monadelphous in a fleshy tube with 10 stamens (partly with globose, dorsifixed anthers and partly with linear to oblong, introrse basifixed anthers and often with 2 stamens lacking anthers.) Ovary sessile with 1-7 ovules and with the greatly elongate style bearded along the inner side and with a small, terminal stigma. Legume subterranean, borne upon the greatly elongate, sterile lower portion of the ovary, 2-3-seeded, indehiscent, slightly constricted between the (1)2(3) seeds.

A genus of 10 (and probably more) species mostly from eastern South America. (Name derived from the earlier generic name *Arachnida* applied to some leguminous plant with subterranean fruits.)

1. *ARACHIS HYPOGAEA* L., Sp. Pl. 741. 1753.

Erect or decumbent, perennial (or annual in cultivation) herb up to 2-7(20) dm long from a taproot and with numerous, ascending branches, loosely pilose to glabrate throughout. Stipules linear, adnate to the petiole for about $\frac{1}{4}$ - $\frac{1}{2}$ their length; subulate-pointed, (1)2-3(5) cm long. Leaves 8-12 cm long, usually with 2 pair of oval, obovate to oblong-obovate leaflets about 2-6 cm long, retuse, truncate, broadly rounded, obtuse to somewhat acute, with short petiolules about 1 mm long. Inflorescence in short, axillary spikes of 3-several, sessile flowers subtended by striate, linear-lanceolate, closely associated, simple or bifid, stipule-like bract and also bractlets.

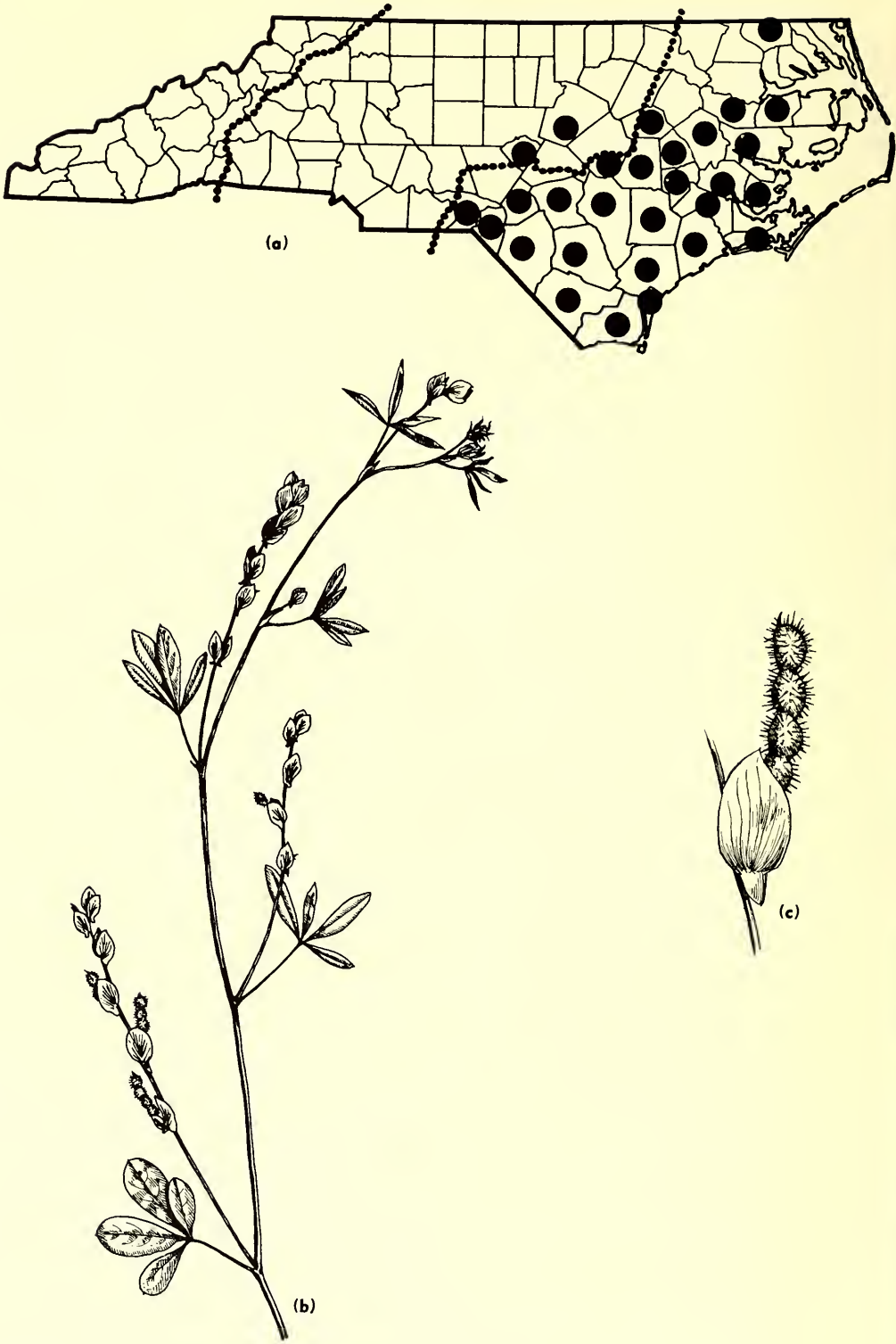


Fig. 62. *Zornia bracteata*. (a) Distribution; (b) Habit sketch; (c) Fruit.

Calyx-tube (really a hypanthium) filiform, spreading short-pubescent, about 2-3 cm long; the 4 upper lobes about 5-6 mm long, united except for the minute, pointed tips, the lowest lobe linear-lanceolate, acuminate, about 6-7 mm long. Corolla yellow or rarely white, the notched standard about 1-1.5 cm long. Stamens with 10 filaments forming a monadelphous, fleshy tube with 8 of the filaments bearing anthers and 2 lacking them; anthers of 3 types: 4 with fertile, globose, dorsifixed, 1-loculate anthers; 3 with fertile, linear to oblong, introrse, basifixed, 2-loculate anthers; and 1 with a fertile, linear to oblong, introrse, basifixed, 1-loculate anther. Ovary inconspicuous at base of hypanthium; style elongate. Legume subterranean, mostly 1-5 cm long with 1-2(3) seeds, indehiscent, usually somewhat constricted between the seeds, reticulate.

DISTRIBUTION: Native of South America but now widely cultivated throughout the tropics and warm temperature regions of both hemispheres; reported as occasionally escaping or persisting after cultivation throughout the southern United States.

Small (1933, p. 729) includes it with the following note "Although only locally escaped in most regions, in others, especially in southeastern N. C., it is abundantly established." There are no specimens of PEANUT in our local herbaria that are indicated as being "established" but it is at least possible that the peanut has become established and has been conscientiously ignored by collectors. It certainly persists for a few years following cultivation reproducing each year by seed.

For a detailed exposition of the flower and fruit see Smith (1950).

24. *STYLOSANTHES* Sw., Prodr. Fl. Ind. Occ. 108. 1788.

Perennial herbs or occasionally shrubs with estipellate pinnately, 3-foliolate leaves and with the stipules adnate to the petiole and united together into a more or less sheath-like tube about the stem with conspicuous, subulate tips. Inflorescence a terminal or axillary, short, leafy-bracted spike or head; the individual clusters consisting of 1-many flowers with or without axial-rudiments subtended by a somewhat glume-like, thinly membranous bract and with 2 bractlets of which one commonly aborts. Calyx-tube short,

campanulate above an elongate, filiform hypanthium resembling a pedicel; the lobes very unequal, the upper 2 united for about $\frac{1}{2}$ their length or more (or reportedly the upper 4 united), the lowermost longest and free. Corolla papilionaceous, the petals inserted at the top of the pedicel-like hypanthium, short-clawed, pale yellow to orange or rarely white; the standard orbicular or broadly obovate, somewhat notched; the wings oblong, auricled, shorter than the standard; keel incurved and often beaked, auriculate at base, about as long as the wing petals. Stamens monadelphous, inserted at the top of the pedicel-like hypanthium, with alternating 5 oblong and sub-basifixed and 5 subglobose and apparently versatile anthers. Ovary sessile; style filiform and persistent with a very small stigma. Legume sessile, slightly compressed, reticulate, composed of 2 segments of which the lower often aborts and becomes stipe-like or occasionally the upper aborts, indehiscent, all developing from petal-bearing flowers contrary to some accounts.

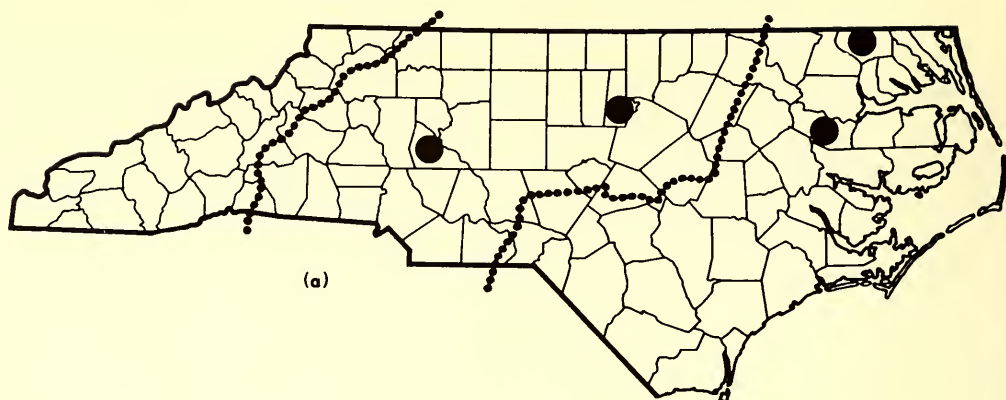
A genus of perhaps 30 species found in the tropics and warm temperate regions of both hemispheres but most numerous in tropical America. (Name derived from the Greek *stylos* = a column and *anthos* = a flower in reference to the stalk-like hypanthium.)

Mohlenbrock (1957), who has most recently revised the genus, treats all of the representatives in the eastern United States north of Florida as one highly variable species in which he found it futile to attempt the recognition of any of the often conspicuous variants. In his later and more detailed study of this PENCIL-FLOWER complex, Mohlenbrock (1958) prepared scatter-diagrams for the following features based upon slightly more than 300 herbarium specimens:

- 1) presence of bristles on stems and/or bracts,
- 2) ratio of leaflet length to width,
- 3) apex of leaflets and
- 4) whether or not the plants were branched.

He found little or no correlation of these various features with one another and very little indication that the various combinations of characteristics were geographically limited.

Fernald presented the following key to distinguish the two most frequently recognized species within this variable complex.



(a)



(b)

Fig. 63. *Arachis hypogaea*. (a) Distribution; (b) Habit sketch.

Erect or stiffly ascending; leaflets of middle and uppermost leaves lanceolate, 1.5-4 cm long; stipular bases of uppermost leaves (subtending fascicles of flowers) or primary bracts usually bristly hispid, their leaflets bristly-ciliate 1. *S. biflora*.
 Depressed or loosely ascending; leaflets of middle and upper leaves oval, elliptical or broadly oblanceolate, 0.5-2.3 cm long; stipular bases of uppermost or bracteal leaves smooth, their blades eciliate 2. *S. riparia*.

For several years it was confidently felt that the above key would readily separate our material. The features most heavily relied upon were the bristly *vs.* short pubescent bases of those stipular bracts closely associated with the inflorescences and the erect *vs.* decumbent habit. More recently careful review of our herbarium material and study of several colonies of these pencil-flowers has convinced me of the correctness of Mohlenbrock's conclusion. Plants were found within a few square yards varying greatly in the very features upon which I relied most heavily to make the specific distinctions and most disturbing to one attempting to maintain these plants as separate species, some branches of the same plant possessed non-bristly stipular bases while others were moderately but coarsely ciliate. In addition certain branches were strongly ascendent while others were decumbent.

Gleason separated *S. riparia* from *S. biflora* by the following key:

Fertile segment of the fruit ovate, the margins about equally convex, the hooked style nearly median *S. biflora*.
 Fertile segment asymmetric, one margin nearly straight, the style distinctly towards one side *S. riparia*.

Kearney also placed great emphasis in his original description on the differences between the position of the style in the two species. However in his original description it is stated that the style on the fruit of *S. riparia* is "almost central on the summit of the loment." While in the discussion which Kearney appends to the description of his new species he states that in *S. biflora* "the segment is much more gibbous on the ventral face, but is straight on the dorsal face, thus throwing the beak quite to the dorsal edge of the

summit." This of course is in direct contradiction to Gleason's account. I was unable to find any real distinction between the two based upon the position of the style-beak in relation to the dorsal suture. Therefore I am inclined to agree with Isely (1955, pp. 113, 114) and Mohlenbrock (1957, p. 329) who both found the position of the style in relation to the suture of the fruit an unusable character.

1. *STYLOSANTHES BIFLORA* (L.)
 BSP., Prel. Cat. N. Y. 13. 1888.

S. riparia Kearney, Bull. Torrey Club 24: 565. 1897.

S. biflora var. *hispidissima* (Michx.) Poll. & Ball, Proc. Biol. Soc. Wash. 13: 134. 1900.

S. riparia var. *setifera* Fern., Rhodora 40: 438. 1938.

Depressed to erect, perennial herb from a woody caudex and tap-root with few to many prostrate, decumbent, ascendent to erect stems usually about 1.5-5 dm high, glabrate, densely short-appressed-pubescent or even bristly-hirsute throughout. Stipules adnate to the petiole and ensheathing the stem, about (4)10-15 mm long, membranous, striate, finely pubescent and often in the median and upper leaves bristly-hirsute, subulate and aristately tipped. Petioles about 3-5 mm long. Leaves pinnately 3-foliate, the leaflets of the median and upper leaves elliptic to broadly oblanceolate or lanceolate or narrowly elliptic, about (0.5)1.5-4 cm long, with an apiculate, acute to obtuse apex and tapering to the cuneate base, with a short-pubescent petiolule about 0.2-0.5 mm long. Inflorescence a few- to several-flowered spike closely subtended and enveloped by the stipular bases of the bracteal leaves of which the uppermost lack leaflets; these upper bracteal leaflets eciliate to abundantly and conspicuously bristly-ciliate and the stipular bracts with long-ciliate, subulate tips and appressed short-pubescent and often bristly-hirsute bases. Hypanthium slender, striate, pedicel-like, glabrous, about 3-4 mm long. Calyx glabrous, the tube campanulate, about 1-1.5 mm long; the upper two lobes more or less united, obtuse, about 1.2-1.8 mm long, the lateral lobes oblong, more or less obtuse, about 1 mm long, the lowermost lobe acute, about 2 mm long. Petals yellow to orange-yellow or rarely whitish, the standard about (5)7-9 mm long. Legume ovate, slightly compressed, reticulate, short-pubescent, about 3-5 mm long, usually only the upper segment

maturing and the lower pedicel-like, obliquely ovate.

The species is frequently treated as being composed of two varieties which apparently differ only in the presence or absence of bristly-pubescent along the stem. Such differences of pubescence are apparently as a rule rather trivial among the legumes and these so-called varieties probably warrant no more than the rank of *formae* if formal recognition is deemed desirable. Both are represented in our collections as shown by the map and have even been collected growing together in the same habitat. Fernald, however (see *Rhodora* 39: 350. 1937) was convinced of the varietal merit of these two populations and Gleason apparently concurred.

They have been separated as follows:

1. Stem and stipules of the median and lower leaves appressed-short pubescent to glabrate 1 a. *S. biflora* var. *biflora*.

1. Stem and stipules of the median and lower leaves hirsute with stiff, spreading, bristly hairs about 2-4 mm long 1 b. *S. biflora* var. *hispidissima*.

1 a. *STYLOSANTHES BIFLORA* var. *BIFLORA*.

Range: Southern New York to Kansas and south to Florida and Texas.

1 b. *STYLOSANTHES BIFLORA* var. *HISPIDISSIMA* (Michx.) Pollard & Ball, *Proc. Biol. Soc. Wash.* 13: 134. 1900.

Range: New Jersey south to Florida west to Arizona and north to Oklahoma and Indiana.

Fernald's prediction of over twenty years ago that "we shall soon have a real 'range' for . . ." the var. *hispidissima* appears yet to be fulfilled. Mohlenbrock in both his revision of the genus and in his analysis of the variation centered about *S. biflora*, submerged it completely as a synonym of *S. biflora* along with numerous other previously recognized species and variants stating that a "sharp line of demarcation among these variants is, however, difficult to determine . . ." This hispid variant does not appear to represent an entity worthy of formal recognition.

25. *DESMODIUM* Desv., *Jour. Bot.* (II) 1:122. 1813. (*nom. conserv.*)

Meibomia Heist. ex Adans., *Fam.* 2:509. 1763.

Erect, decumbent or procumbent annual, perennial (as in almost all of ours) herbs or shrubs or small trees (some foreign species). Stipules caducous to long-persisting, ovate to subulate, foliaceous to scale-like, often striate. Leaves subsessile to long-petiolate, usually pinnately 3-foliate in our species (or occasionally reduced to but 1 leaflet) but elsewhere occasionally typically 1-foliate or 5-foliate. Stipels usually present and persistent but in some species lacking. Inflorescence terminal or from the upper axils, paniculate or occasionally racemose, with the pedicel of each flower subtended by a "secondary" bract (= bractlet) and the 1- to few-flowered clusters subtended by a "primary" bract. Calyx appearing slightly to distinctly two-lipped from the often unequally developed and united lobes. The upper 2 lobes often mostly united and scarcely bifid at apex, the lower lobes more deeply divided and the lowermost the longest; the tube campanulate to turbinate. Corolla papilionaceous, pink, roseate, purple, bluish or white; the standard oblong, obovate to almost orbicular, the wings oblong and slightly adherent to the somewhat falcate keel; the petals all narrowing to the base or even clawed. Stamens monadelphous or in most of our species diadelphous (at least above the middle), 9 and 1). Fruit a loment and short- to long-stipitate, usually exserted beyond the calyx-tube. Loment-segments (1)2-many, usually flattened and densely uncinulate-puberulent or uncinulate-pubescent, typically flattened and separating into 1-seeded, indehiscent segments.

A genus of perhaps 200 species native to much of the Americas as well as Australia, eastern Asia and Africa. (Name derived from the Greek *desmos* meaning a bond or chain in reference to the jointed loment.)

This is the largest and certainly one of the more difficult genera among the Carolina legumes. For the satisfactory determination of BEGGAR'S TICKS, matured fruit is often essential.

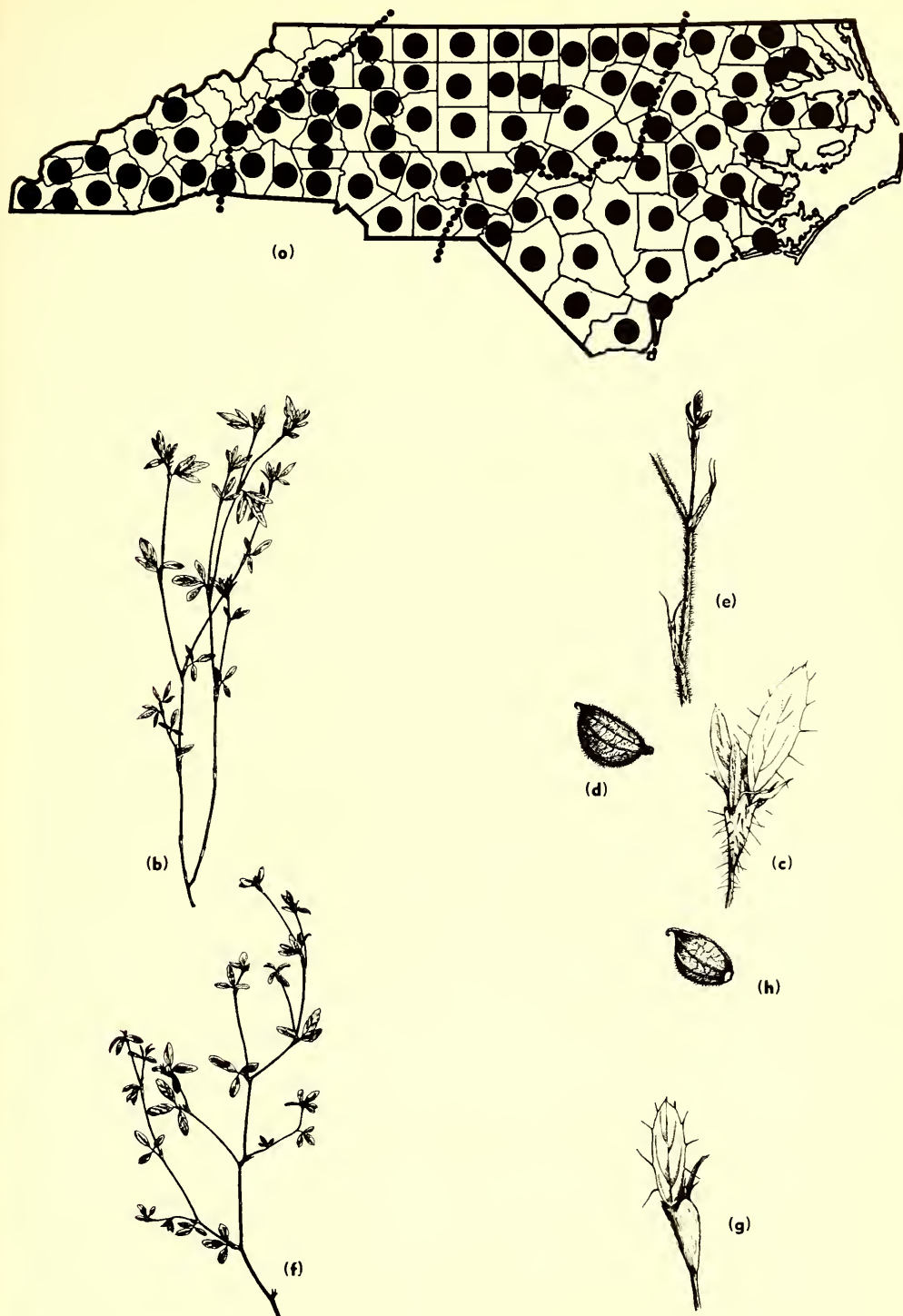


Fig. 64. *Stylosanthes biflora*. (a) Distribution of *S. biflora* with variant "hispidissima"; (b) Habit sketch of *S. biflora* s.s.; (c) Leaf showing hispid sheathing stipules of typical variant; (d) Fruit; (e) Hispid stem of the variant "hispidissima"; (f) Habit sketch of the variant "riparia"; (g) Leaf showing non-hispid sheathing stipules of "riparia" variant; (h) Fruit from "riparia" variant.

1. Stipe of fruit greatly exceeding the remnants of the filaments and 3-times the length of the calyx or even longer; the longest calyx-lobe less than half the length of the tube; stipels usually lacking or, if present, soon deciduous; stamens monadelphous. (Series *Americana* Schub.)
2. Pedicels 1 cm or more in length; flowering stem usually leafless and arising from the underground caudex but rarely leafy 1. *D. nudiflorum*.
2. Pedicels less than 1 cm long; flowering branches arising from the leafy stem.
3. Terminal leaflet as broad as long or nearly so; loment-stipe glabrous; petals usually pinkish or rose-purple but rarely white; leaves usually clustered just beneath the strongly exserted, 3-8 dm long inflorescence 2. *D. glutinosum*.
3. Terminal leaflet longer than broad; loment-stipe usually uncinulate-puberulent; petals white; leaves scattered, inflorescence less than 2 dm long 3. *D. pauciflorum*.
1. Stipe of the fruit exceeded in length by the remnants of the filaments and usually less than 2-times the length of the calyx; the longest calyx-lobe usually equaling to greatly exceeding the tube in length; stipels persistent; stamens diadelphous at least above (9 and 1).
4. Stipules conspicuous and ovate-attenuate, cordate to semicordate at base. (Series *Stipulata* Schub.)
- 5 Plants with prostrate or trailing stems.
6. Terminal leaflets mostly orbicular; petals purplish; loment-segments more or less densely uncinulate-puberulent on the sides 4. *D. rotundifolium*.
6. Terminal leaflets more or less ovate; petals creamy to whitish; loment segments sparsely, if at all, puberulent on the sides 5. *D. ochroleucum*.
5. Plants with erect or strongly ascendent stems 6. *D. canescens*.
4. Stipules usually narrow and relatively inconspicuous, slenderly ovate to lance-attenuate or linear or even setaceous (but at least not broadly clasping at base).
7. Bracts subtending flower-clusters (*i.e.* the primary bracts) more than 6 mm long; leaflets glabrous or nearly so beneath (Ser. *Longibracteata* Schub.) 7. *D. cuspidatum*.
7. Bracts subtending flower-clusters (*i.e.* the primary bracts) less than 6 mm long; leaflets glabrous to densely pubescent beneath.
8. Plants with prostrate, trailing stems; leaflets always less than twice as long as wide and often just as wide as long (Ser. *Pauciarticulata* Schub.) 8. *D. lineatum*.
8. Plants with erect or strongly ascendent stems; leaflets the same as above or often 2-times or more longer than broad.
9. Leaves velvety-tomentose beneath (Ser. *Stipitata* Schub.)
10. Terminal leaflets of medial leaves usually rhombic to deltoid, usually acute to cuneate or truncate at base, mostly two-thirds or more as wide as long; loment straight or nearly so, the segments rhomboidal or nearly so with the upper suture straight or bluntly angled and the lower suture angled to somewhat rounded 9. *D. viridiflorum*.
10. Terminal leaflets of medial leaves elliptic-ovate, typically rounded at base, usually not much more than half as wide as long; loment typically arching, the segments rounded both above and below. 10. *D. Nuttallii*.
9. Leaves glabrous or if pubescent at least not soft-velvety to the touch beneath.
11. Plants annual from a taproot 11. *D. tortuosum*.
11. Plants perennial.
12. Loment-segments 1-3(4) in number, the segments often rounded above or below or both; corolla 3-5(6) mm long. (Ser. *Pauciarticulata* Schub.)
13. Leaflets linear to linear-lanceolate, mostly 4-times or more as long as wide.

14. Petioles very short and often apparently lacking, mostly 1-3 mm long; stems conspicuously and densely short-pubescent to the unaided eye 12. *D. sessilifolium*.
14. Petioles short to rather elongate, those of the median and lower leaves over 5 mm long; stems not conspicuously and densely short-pubescent when viewed without magnification, usually appearing on casual inspection to be glabrous or nearly so.
15. Upper margin of the loment-segments convex (*i.e.* slightly curving outwardly), plants of savannas, pocosin-margins, or shallow ditches ... 13. *D. tenuifolium*
15. Upper margin of the loment-segments flattened or slightly concave (*i.e.* inwardly bowed or incurved), plants of dry sandy or clayey pinelands or turkey-oak sandhills 14. *D. strictum*.
13. Leaflets elliptic, ovate, oblong or orbicular, mostly less than 3.5-times as long as wide.
16. Stems and petioles sparsely to densely long, spreading-pilose .. 15. *D. ciliare*.
16. Stems and petioles glabrous to densely uncinat-pubescent but lacking pilose trichomes.
17. Stems and petioles glabrous to sparingly uncinulate-puberulent; leaflets glabrous to moderately pubescent beneath; petioles of the median leaves characteristically equaling or longer than the breadth of the lateral leaflets 16. *D. marilandicum*.
17. Stems and petioles densely uncinat-pubescent especially along rachis of inflorescence; leaflets densely pubescent beneath; petioles of the median leaves usually shorter than the breadth of the lateral leaflets 17. *D. obtusum*.
12. Loment-segments (1)3-5(6) in number, the segments usually angular; corolla mostly 6-9 mm long. (Ser. *Stipitata* Schub.)
18. Leaflets narrow, usually 3-8-times longer than broad; plants glabrous to sparsely appressed short-pubescent 18. *D. paniculatum*.
18. Leaflets wider, usually less than 3-times longer than broad; plants glabrous to densely pubescent.
19. Leaves glabrous or very nearly so beneath and glaucous; pedicels mostly 10-19 mm long 19. *D. laevigatum*.
19. Leaves pubescent and non-glaucous beneath; pedicels mostly less than 1 cm long but occasionally up to 1.2 cm.
20. Pubescence on the lower side of the leaflet inconspicuous and restricted primarily to the principal veins and then short-uncinate 20. *D. Fernaldii*.
20. Pubescence on the lower side of the leaflets usually conspicuous and appressed to wide-spreading, straight and not hooked.
21. Pubescence of medial portion of stem densely uncinulate-puberulent and very sparingly, if at all, supplied with pilose trichomes 21. *D. glabellum*.
21. Pubescence of medial portion of stem moderately to densely pilose 22. *D. perplezum*.

1. *DESMODIUM NUDIFLORUM* (L.)
DC., Prodr. 2:330. 1825.

Meibomia nudiflora (L.) Kuntze, Rev. Gen.
1:197. 1891.

Perennial herb with two distinct types of stems: one differentiated into an erect, unbranched, sterile shoot about 0.5-3 dm tall bearing a closely aggregated cluster of leaves near its summit and the other an almost invariably leafless (although in formae *personatum* and *foliolatum* bearing 1-several leaves) inflorescence-shoot about 0.4-1 m high; both stem-types glabrate or with but a few ascendent, pilose hairs. Stipules caducous, inconspicuous or up to 5 mm long. Petioles mostly 5-9 cm long and sparingly pilose with upwardly appressed pubescence. Leaves mostly 4-7 in number borne in a tight, terminal cluster or somewhat scattered, pinnately 3-foliate with the rachis-stalk of the terminal leaflet mostly 1-2 cm long and only rarely with any stipels present. Terminal leaflets 1 obovate, broadly elliptic or ovate, symmetrical, mostly 4-10(12) cm long and 3-6(8) cm wide, usually 1.5-1.7-times longer than broad, obtuse or more commonly acute to acuminate at apex and cuneate to broadly rounded at base, both surfaces appearing glabrous but usually sparingly uncinete-puberulent to short-pubescent especially along the veins above with very abundant, inconspicuous (even at 15 X magnification) trichomes; the lateral leaflets smaller, asymmetrical and often basally oblique, in general ovate-oblong, mostly 3.5-7(10) cm long and 3-5 cm wide. Fertile stems 1 to several and arising subterraneanly, erect or strongly ascendent, scapose (or rarely with 1-3 leaves), about (3)5-8(10) dm high with the racemose or paniculate inflorescence usually restricted to the upper third; pedicels wide-spreading to ascending, glabrous to minutely puberulent, slender, about 1-2 cm long and in clusters of 2-3 at a node, with a caducous bract of about 2 mm subtending the cymule and each pedicel subtended by an inconspicuous, minute, caducous, secondary bract about 0.5 mm long. Calyx campanulate, about 2.5-3.2 mm long, thin, with broadly triangular-dentate lobes, glabrous. Corolla 5-8 mm long, the petals subequal, rose or purplish or rarely white. Stamens monadelphous. Stipe of fruit slender, glabrous, (0.8) 1-1.5(2) cm long and greatly exceeding the remnants of the filaments which enclose its basal portion for 6-7 mm. Loment-segments (1)2-4 in number, each about 6-8(12) mm long and 4-5 mm wide; upper margin of the semi-obovate loment-segment straight or but slightly convex; lower suture of the loment deeply indented and the connective between the segments very narrow (1 mm

wide or less) and forming part of the straight upper suture; densely uncinete-pubescent.

DISTRIBUTION: A woodland species ranging throughout much of the eastern United States from southern Maine to central Minnesota and south to northern Florida and eastern Texas.

Schubert recognized f. *Dudleyi* House which includes the white-petaled form as well as the two following forms which possess some leaves, on what in the typical form, is the leafless inflorescence: f. *foliolatum* (Farwell) Fassett with leaves scattered on the flowering branch and f. *personatum* Fassett with the leaves clustered together or with a branched and leafy flowering stem. The second of these minor variants has been seen in several collections and the others are probably here as well. They are not deserving of formal taxonomic recognition.

2. *DESMODIUM GLUTINOSUM* (Muhl.
ex Willd.) Wood, Classbook 120. 1845.

Hedysarum glutinosum Muhl. ex Willd.,

Sp. Pl. 3:1198. 1802.

Hedysarum acuminatum Michx., Fl. Bor.
Am. 2:72. 1803.

D. acuminatum (Michx.) DC., Prodr. 2:329.
1825.

Meibomia acuminata (Michx.) Blake, Bot.
Gaz. 78: 277. 1924.

Perennial herb about (0.4)0.6-1(1.2) m high with a solitary, erect stem unbranched beneath the inflorescence and sparsely to moderately spreading pilose or becoming glabrate with age. Stipules narrowly linear, mostly (0.5)0.8-1.2(1.5) cm long and about 0.3-1 mm wide, sometimes soon deciduous but often persisting until after the fruits mature. Leaves usually borne in an almost subverticillate cluster about 1-4 dm above the base of stem (or in form *Chandonetti* with the leaves scattered or 2 or more leaves scattered and the others tightly clustered), pinnately 3-foliate or occasionally 1-foliate (typically so in form *unifoliatum* Schub.) and with the rachis-stalk mostly 1-4 cm long. Petiole strongly divergent, sparsely pilose or villous, mostly (2)5-9(12) cm long. Terminal leaflets broadly ovate or almost orbicular, about 6-10(15) cm long and (4)6-9(12) cm wide, usually about as wide as long or even wider, the apex conspicuously acuminate and the base cuneate to very broadly rounded; lateral leaflets smaller, asymmetrically ovate to ovate-

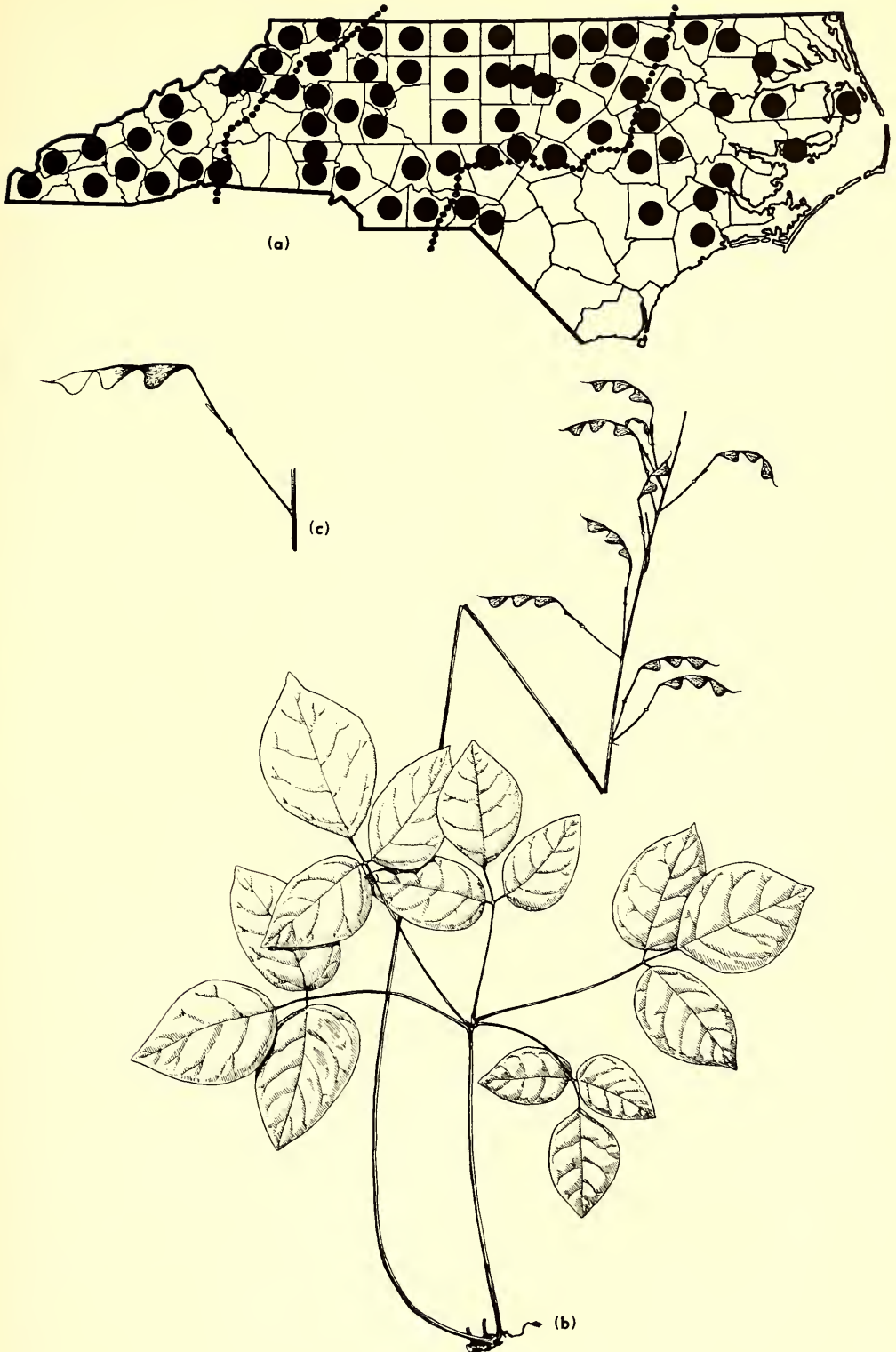


Fig. 65. *Desmodium nudiflorum*. (a) Distribution; (b) Habit sketch; (c) Fruit.

oblong with a conspicuously acuminate apex and an oblique base, (4)6-9(12) cm long and (2)4-6(8) cm wide; pubescence of both surfaces rather sparse and ascendent to strongly spreading, villous below to almost strigose above; the petiolules thick, densely strigose, about 2-6 mm long; stipels absent or but very rarely present. Rachis of inflorescence a continuation of leaf-bearing stem and greatly exceeding the leaves, terminal, about 3-8 dm long, racemose in smaller plants but more typically much-branched and thus paniculate with the branches often widely divergent; the main axis and its branches uncinulate-puberulent and also sparsely pilose or villous. Pedicels slender, ascendent, densely uncinulate-puberulent, 2-5(8) mm long, usually in groups of 2-3 at a node and with the cymule subtended by a linear, uncinulate-puberulent bract about 2-3 mm long and the individual pedicels subtended by a similar "bractlet" (i.e. the secondary bract) of about 0.5 mm long. Calyx broadly campanulate, minutely puberulent, 1.5-3 mm long, the lobes inconspicuous and broadly triangular-dentate. Corolla rose-purplish or rarely white, about 5-7 mm long. Stamens monadelphous. Stipe of fruit slender, glabrous, about 4-10 mm long and exceeding the remnants of the sheath-like filaments. Loment-segments (1)2-3(4) in number, each about 8-10(12) mm long and (4)5-6(7) mm wide, densely uncinulate; upper margin of the semi-obovate loment-segments straight or concave; lower margin of loment deeply indented with a very narrow connective forming part of the straight upper suture.

DISTRIBUTION: A woodland species ranging throughout much of the eastern United States from Maine to Minnesota and south to northern Florida and to eastern Texas and occurring as a disjunct in the central and northern Mexican highlands.

Three forms differing in the arrangement and complexity of the leaves have been previously recognized and all occur in North Carolina. Although in my opinion not meriting formal recognition, they may be distinguished as follows:

1. Leaflets trifoliolate, leaves clustered at the base of the inflorescence or scattered along the stem.
2. Leaves clustered at base of inflorescence a.) f. *glutinosum*.
2. Leaves scattered along the stem b.) f. *Chandonetii* (Lunell) Schub.
1. Leaflets unifoliolate, leaves scattered along the stem c.) f. *unifoliatum* Schub.

3. *DESMODIUM PAUCIFLORUM* (Nutt.) DC., Prodr. 2:330. 1825.

Meibomia pauciflora (Nutt.) Kuntze, Rev. Gen. 1:198. 1891.

Perennial herb about 1.5-5(7) dm high with simple to much-branched, solitary, ascendent to decumbent, often zig-zag stems with sparse and inconspicuous, spreading or appressed, pilose to villous pubescence. Stipules narrowly lanceolate to subulate, about 1.5-5 mm long, caducous. Leaves scattered over much of the stem, pinnately 3-foliolate and with the rachis-stalk of the terminal leaflet about 0.5-1.2 cm long. Petioles strongly divergent to ascendent, sparsely strigose or pilose pubescent, about 3-7.5 cm long. Terminal leaflets obovate, rhombic or ovate, about (2.5)4-7(9) cm long and (2)3-6 cm wide, usually about as long to 1.5-times longer than wide, the apex usually acute to short-acuminate and the base cuneate to broadly rounded; the lateral leaflets smaller, asymmetrically ovate, with an acute apex and a broadly rounded and often somewhat oblique base, about (2)4-6(8) cm long and (1.5)3-5 cm wide; pubescence on both surfaces sparsely appressed strigose to glabrate and also with more numerous minute trichomes (scarcely visible with 15 X magnification) especially abundant on the lower surface; the petiolules densely strigose, thick, mostly 2-5 mm long; stipels apparently never formed. Inflorescence of axillary or terminal racemes or becoming paniculate, frequently partially obscured by the leaves and not greatly exceeding them, about 0.5-1.5(2) dm long, sparsely to densely but minutely uncinulate-puberulent. Pedicels short, widely spreading to ascendent, usually densely and minutely uncinulate-puberulent, about 2-8(10) mm long and borne in (1)2-3-flowered clusters subtended by a linear bract 1-3 mm long and the individual pedicels subtended by a triangular bractlet of about 0.5 mm long. Calyx broadly campanulate, densely but minutely uncinulate-puberulent, about 1.5-2.5 mm long, the lobes broadly triangular-dentate. Corolla white, about 5-7 mm long. Stamens monadelphous. Stipe of the fruit slender, glabrous to sparsely uncinulate-puberulent, about 5-10 mm long and greatly exceeding the remnants of the sheath like filaments. Loment-segments 1-2(3) in number, each about 9-12(14) mm long and 5-8 mm wide, densely uncinulate-puberulent on sides and often sparsely strigose on the sutures; upper margin of the loment-segments straight or concave; lower margin of the loment deeply incised with the very narrow connective forming part of the nearly straight upper suture.

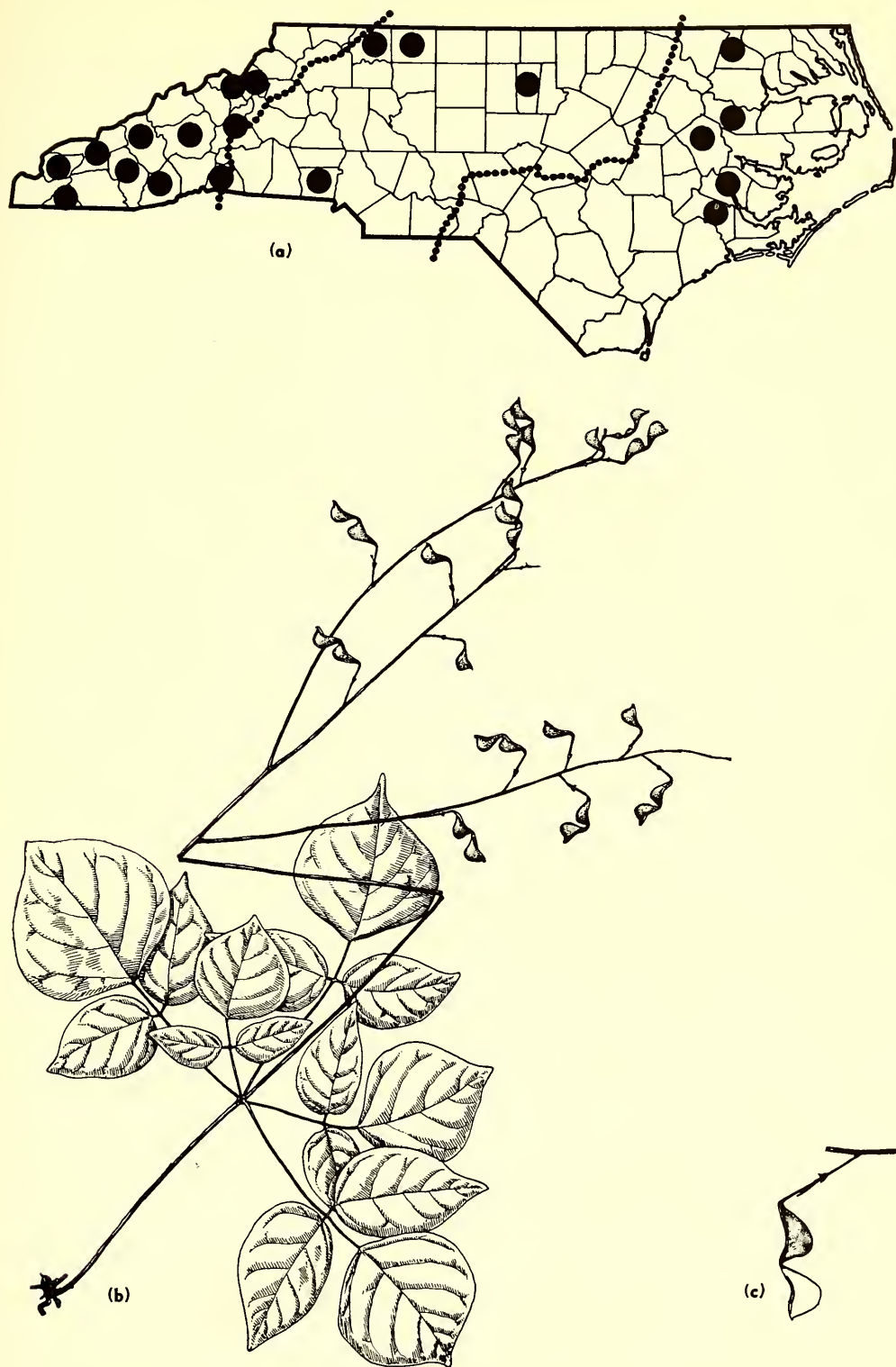


Fig. 66. *Desmodium glutinosum*. (a) Distribution; (b) Habit sketch; (c) Fruit.

DISTRIBUTION: A rare to occasional species of rich woodlands throughout much of the eastern United States from western New York to eastern Kansas and south to northern Florida and eastern Texas.

The three species treated: *D. nudiflorum*, *D. glutinosum* and *D. pauciflorum*, are taxonomically widely separated from the rest of the eastern North American species whose relationships are apparently with the numerous species of Mexico. The above mentioned three species are more closely related to the Asiatic species and together form the Section *Podocarpum* which was treated in detail by Isely (1951). Schindler divided the aggregate genus *Desmodium* into several genera which he thought indicated more clearly the phylogenetic history of these plants. The first three species in our treatment of the North Carolina beggar's lice were considered by Schindler as belonging to the genus *Desmodium* while the rest of our species were placed in the genus *Meibomia*. It is well to note in passing that this use of *Meibomia* is different than that of many earlier American workers who used *Meibomia* as an exact synonym of *Desmodium* following the American Code's requirement of strict priority.

4. DESMODIUM ROTUNDIFOLIUM DC., Prodr. 2:330. 1825.

Meibomia Michauxii Vail, Bull. Torrey Club 23:140. 1896.

Perennial herb with prostrate, trailing, vine-like branched stems mostly 0.5-1.5 m long and usually densely spreading pilose or villous or occasionally (in form *glabrata* (Gray) Schub.) glabrous except for the sparse uncinulate-puberulences. Stipules conspicuous, persistent, ovate, obliquely broadly clasping at base, acute to short-acuminate at apex, densely ciliate to villous externally, glabrous or nearly so within, often becoming strongly reflexed in age, about 8-12 mm long. Petioles of the principal leaves mostly 3-5 cm long and with pubescence resembling that of the stems (i.e. usually densely spreading pilose to villous). Leaves pinnately 3-foliolate with the rachis-stalk of the terminal leaflet 0.7-1.8 cm long. Terminal leaflets suborbicular to somewhat broadly and roundly rhombic or even obovate, about 3-5(7) cm long and usually about as wide or even wider than long, obtuse to broadly rounded at apex and usually

broadly cuneate at base; the lateral leaflets smaller and usually inconspicuously asymmetrical, generally more or less orbicular or broadly oblong; both surfaces appressed to spreading pilose or villous; the petiolules densely villous, about 2-4 mm long; stipels usually persisting and about 1-2.5 mm long. Flowers borne in typically axillary but occasionally terminal, simple racemes or in but little-branched panicles forming loose, open clusters of 3-9 flowers towards the apex and the peduncle interrupted with pairs of ovate, clasping bracts; the inflorescence mostly 1-3 dm long and usually densely villous. Pedicels slender, about 6-13 mm long, densely uncinulate-puberulent and subtended by a quickly deciduous triangular to linear bractlet of about 1.5-3 mm long within the broadly clasping, soon deciduous, often ovate bract which subtends the cymule. Calyx-tube broadly campanulate, sparsely pilose to puberulent, about 1.5-2.5 mm high; the lobes 1-1.5 mm long, triangular-lanceolate, the upper almost completely united except for the bifid indentation. Corolla purple, about 8-10 mm long. Stamens diadelphous. Stipe of the fruit slender, short, mostly included within the calyx-tube and exceeded by the remnants of the filaments, about 2.5-5 mm long. Loment-segments (3)4-6 in number, each about 5-7 mm long and 4.5 mm wide, both sutures and sides densely uncinulate-puberulent; upper margin of the loment-segments convex; indentations from both margins of the loment about equal and the connective between the loment sections about medial and about 1-2 mm wide.

DISTRIBUTION: A wide-ranging species of dry or open woodlands from Southern Vermont to Michigan and south to eastern Texas and northern Florida.

5. DESMODIUM OCHROLEUCUM M. A. Curtis, Proc. Acad. Phil. 1864: 17. 1864.

Meibomia ochroleuca (M. A. Curtis) Kuntze, Rev. Gen. 1:198. 1891.

Perennial herb with prostrate or decumbent, trailing, branched stems mostly 0.5-1 m long and usually densely spreading-pilose as well as uncinulate-puberulent. Stipules conspicuous, ovate to ovate-lanceolate, persistent, clasping, acute to short-acuminate at apex, externally puberulent, about 6-10 mm long and often becoming reflexed in age. Petioles of the principal leaves about (1)2.5-5(6) cm long and with densely pilose and also uncinulate-puberulent pubescence. Leaves usually pinnately 3-foliolate (or occasionally 1-foliolate) with the rachis-stalk of the terminal leaflet about 0.4-1.2(1.5) cm long. Terminal

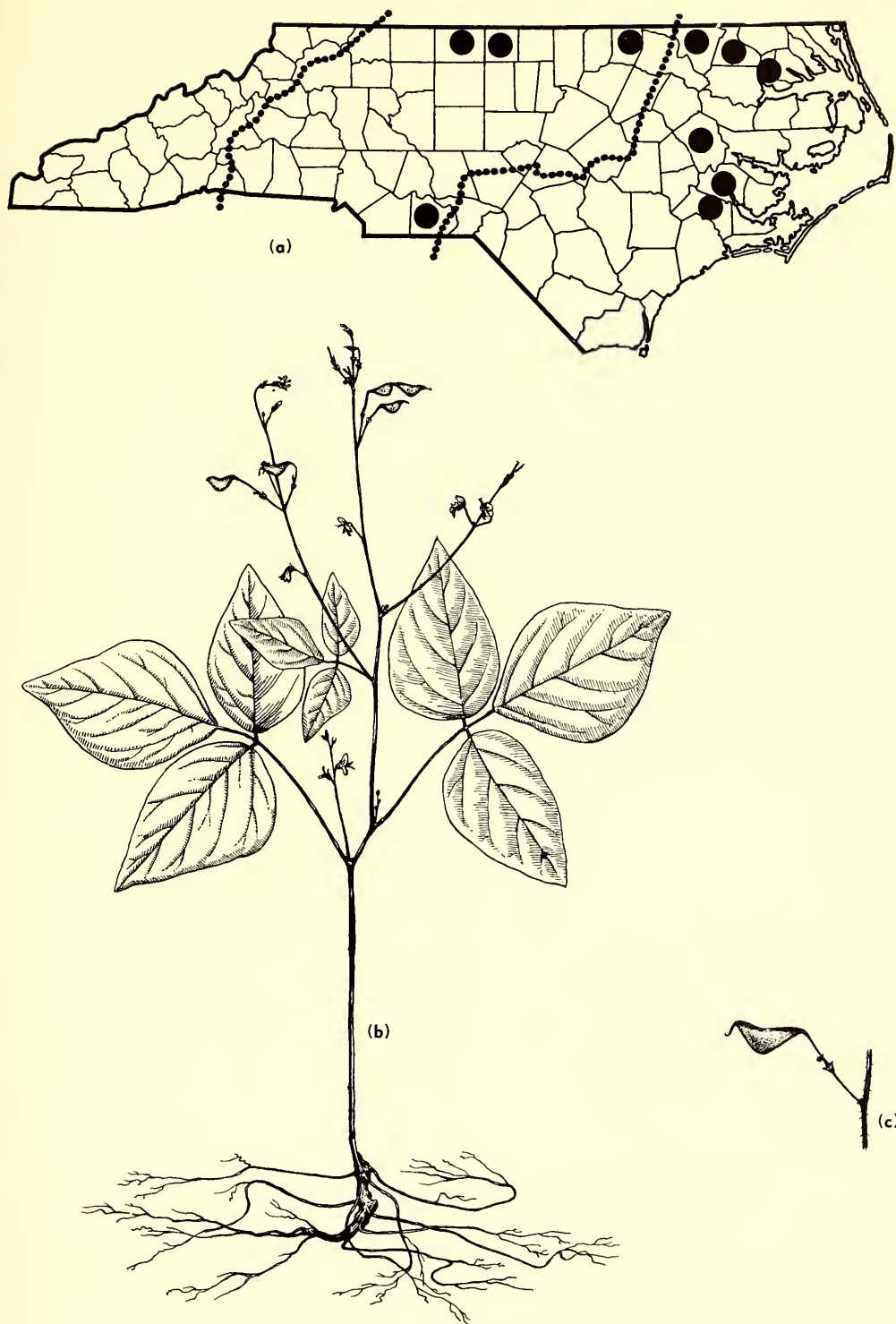


Fig. 67. *Desmodium pauciflorum*. (a) Distribution; (b) Habit sketch; (c) Fruit.

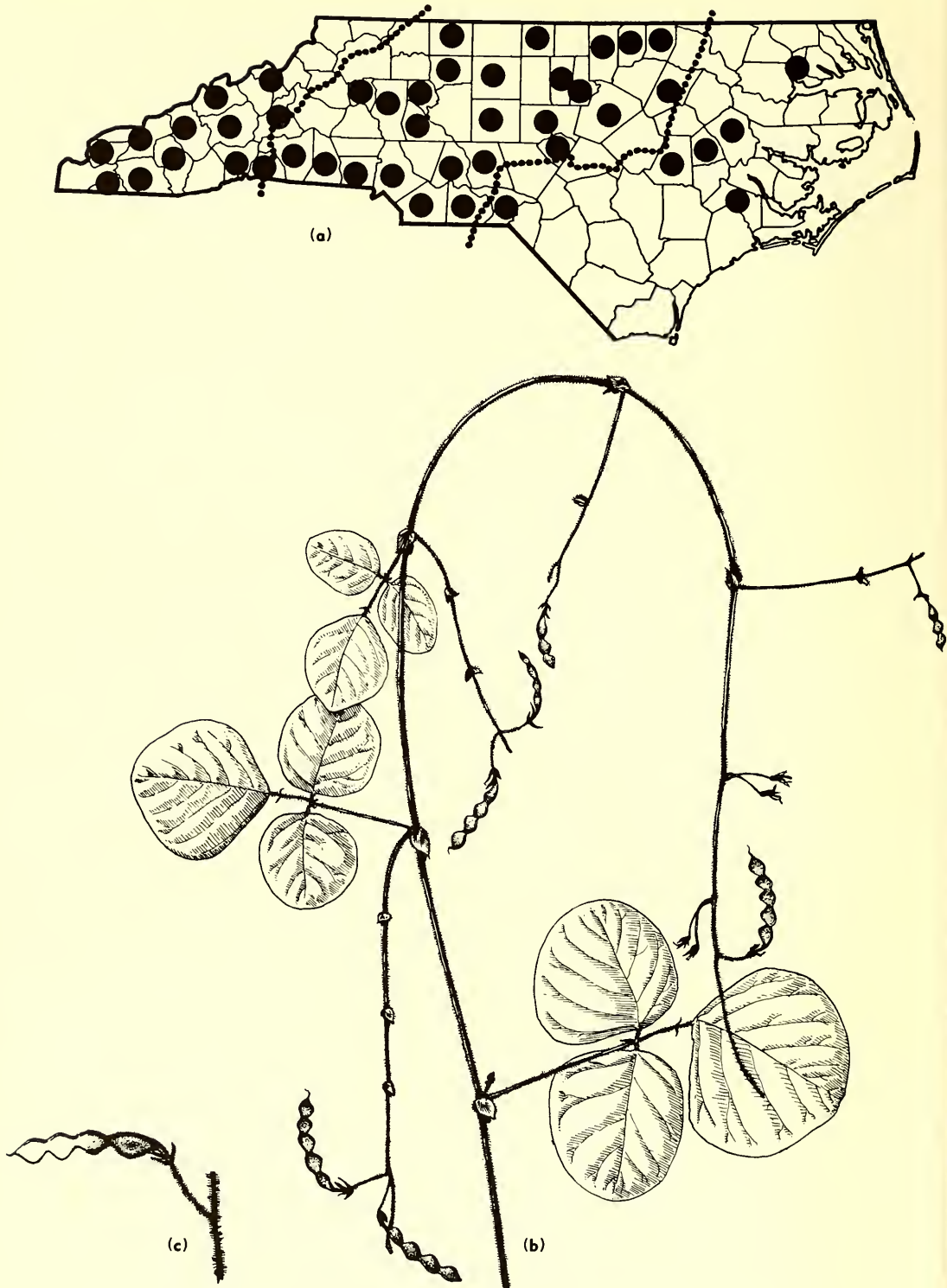


Fig. 68. *Desmodium rotundifolium*. (a) Distribution; (b) Habit sketch; (c) Fruit.

leaflet cordate-ovate to rhombic-ovate, mostly about 3.5-7 cm long and 2.5-5 cm wide and almost always longer than wide, obtuse or occasionally acute at apex and rounded, truncate or even cordate at base; the lateral leaflets smaller, asymmetrical, obliquely ovate, usually obtuse; both surfaces noticeably reticulate-veined and sparsely to moderately uncinulate-puberulent and with occasional pilose trichomes which below are restricted to the midvein; the petiolules densely pubescent and about (1)2-4 mm long; stipels persisting and about 1-2.2 mm long. Inflorescences axillary or terminal, usually simple and hence racemose, occasionally somewhat paniculate, about 1-2(3) dm long, densely villous-pubescent with the ovate to ovate-lanceolate bracts soon deciduous and about 2.5-3.5 mm long. Pedicels slender, about (0.5)1-2 cm long, densely uncinulate-puberulent and subtended by a caducous, linear bractlet of about 1.8-2.2 mm long. Calyx-tube broadly campanulate, sparsely to moderately uncinulate-puberulent and short-pilose, about 1.5-2 mm high; the longest lobe about 1.8-2.5(4.5) mm long, the others up to 2 mm long, the upper 2 almost completely united. Corolla white to creamy and about 8 mm long. Stamens diadelphous. Stipe of the fruit short, mostly included within the calyx-tube and exceeded by the filaments, about 2-3 mm long. Loment-segments 2-4 in number, each about 7-10 mm long and 5-7(8) mm wide, subelliptic to subrhombic in shape and often twisted at the connective, strongly reticulate and glabrous or nearly so along the sides while densely uncinulate-puberulent along the sutures and with the connective medial or nearly so and about 1.5-2 mm wide.

DISTRIBUTION: An uncommon species of dry, open, sandy places and woods from Delaware south to Georgia and also in Tennessee and Missouri.

6. *DESMODIUM CANESCENS* (L.) DC.,
Prodr. 2:328. 1825.

Meibomia canescens (L.) Kuntze, Rev. Gen. 1:195. 1891.

Perennial herb arising from a 1-4 dm long tap-root with erect, often much-branched stem mostly 0.6-1.5 m high and at least above very densely spreading pilose and villous as well as puberulent and the tips of the trichomes usually uncinulate. Stipules ovate to ovate-lanceolate with an acuminate apex and a broad, partially clasping base, conspicuously long-villous ciliate along the mar-

gin and often minutely but very densely puberulent on the outer surface, mostly (0.5)0.7-1.2(1.5) cm long, long-persistent and often wide-spreading or even reflexed at maturity. Petioles of the principal leaves (2)5-10(12) cm long, densely but minutely puberulent and sparsely to copiously, spreading pilose or villous. Leaves pinnately 3-foliolate with the rachis-stalk of the terminal leaflet about 1-3.5 cm long. Terminal leaflet ovate to ovate-lanceolate with an almost truncate, broadly rounded to occasionally even cuneate base and obtuse to acute or even short-acuminate at the apex, about 5-12(15) cm long and 3-8(10) cm wide, ranging from about $\frac{1}{4}$ - $\frac{2}{3}$ but usually about a half as wide as long; the lateral leaflets in general similar but smaller, usually very inconspicuously asymmetrical; both surfaces inconspicuously reticulate and sparsely to moderately uncinulate-pubescent; the petiolules densely pilose and about 2-5 mm long; stipels persisting, linear and about 2-7 mm long. Inflorescences racemose or more commonly paniculate, axillary or terminal, usually lax and loosely flowered, mostly 1-4.5 dm long, the axis and branches usually copiously villous as well as densely uncinulate-puberulent. Pedicels slender, arching, villous and puberulent, about 0.5-1(1.5) cm long and subtended by usually caducous, ovate to ovate-lanceolate bracts about 3-7 mm long. Calyx-tube broadly campanulate, about 1.5-2.2 mm long and greatly exceeded by some or all of the linear to triangular-lanceolate lobes of about 1.5-5 mm long; the calyx densely villous and copiously minutely puberulent. Corolla pinkish to purple or rarely white, about 1 cm long. Stamens diadelphous. Stipe of the fruit about 2-5 mm long and included within the calyx. Loment-segments (1)3-5(6) in number, each about 6-13 mm long and 4-7(8) mm wide, semi-rhomboid, both sutures and sides densely uncinulate-puberulent; upper margin of the segments nearly straight to convex; loment most deeply indented from the lower side leaving a connective nearer the upper side about 1-2 mm wide.

DISTRIBUTION: A wide-ranging species of moist to dry wood's margins and fields from Massachusetts to eastern Nebraska and south into northern Florida and eastern Texas.

This includes the var. *hirsutum* (Hook.) Robinson which does not appear distinguishable except as an extreme. The attempt to recognize such variants is not very meaningful since it is impossible to delimit them objectively.



Fig. 69. *Desmodium canescens*. (a) Distribution; (b) Habit sketch; (c) Fruit.

7. *DESMODIUM CUSPIDATUM* (Muhl. ex Willd.) Loud., Hort. Brit. 309. 1830.

D. grandiflorum (Walt.) DC., Prodr. 2:338. 1825. (The basionym is however a later homonym.)

D. bracteosum (Michx.) DC., Prodr. 2:329. 1825.

Meibomia bracteosa (Willd.) Kuntze, Rev. Gen. 1:195. 1891.

Meibomia grandiflora (Walt.) Kuntze, Rev. Gen. 1:196. 1891.

Meibomia cuspidatum (Willd.) Schindl., Rep. Spec. Nov. 20:140. 1924.

Perennial herb arising from a thick, often gnarled root often 1.5 dm long or more with an erect, usually stout stem of about 0.6-1.2 m high or more and glabrous to uncinulate-puberulent. Stipules ovate- to lance-attenuate, moderately persistent or soon deciduous, often obliquely asymmetrical, glabrous, about 1-2 cm long. Petioles with a broad, shallow groove above, glabrous or nearly so, those of the principal leaves mostly about 4-8(10) cm long. Leaves pinnately 3-foliolate with the rachis-stalk of the terminal leaflet about 1.8-3.5 cm long and with a broad, shallow groove above. Leaflets ovate to ovate-lanceolate, acute or more commonly acuminate at apex, broadly rounded to bluntly cuneate at base, about (5)6-10(14) cm long and about (3)4-5.5(7) cm wide, about 1.5-2.5-times longer than wide; the lateral leaflets similar to the terminal but smaller; both surfaces glabrous or sparsely pubescent along the midvein and principal veins with short trichomes; the petiolules 3-5 mm long, glabrous to sparsely short-pubescent; stipels persisting, very narrowly linear or setaceous, about 3-6 mm long. Inflorescence usually a loosely-branched, open panicle or less commonly racemose, typically terminal, mostly 1.5-4 dm long, the axis and the branches usually ribbed and moderately to densely uncinulate-pubescent. Pedicels about 2-7 mm long, minutely puberulent but often with short-pubescent trichomes sparsely interspersed and subtended by soon deciduous, small, triangular bractlets (= secondary bracts) about 0.5-0.8 mm long and the 1-3-flowered cymules subtended by sharply acuminate, striate, caducous, glabrous bracts about 4-7(10) mm long. Calyx-tube broadly campanulate, about 1-2 mm high and usually equaled or exceeded by some or all of the linear to narrowly triangular calyx-lobes; the calyx glabrous or very nearly so. Corolla pink to purplish, about 6-10(12) mm long. Stamens diadelphous. Stipe of the fruit about 2-5 mm long and usually equaling or somewhat exceeding the calyx but shorter than the rem-

nants of the filaments. Loment-segments (1)3-7 in number and each about 7-11 mm long and 4-5 mm wide, somewhat elliptic to semirhomboidal, with the sutures and the connecting isthmi more densely uncinulate-puberulent than the conspicuously reticulate sides.

DISTRIBUTION: A wide-ranging species of rich woods and openings from southern New Hampshire to Minnesota and south into Florida and eastern Texas.

This species has been treated most recently as being composed of two varieties. The var. *longifolium* (T. & G.) Schub. is a plant of the Mississippi drainage system and is distinguished from our representative by ciliate bracts and stipules and pilose-pubescent leaves. This midwestern taxon has often been considered as a distinct species.

8. *DESMODIUM LINEATUM* DC., Prodr. 2:330. 1825.

Meibomia arenicola Vail, Bull. Torrey Club 23:139. 1896.

Meibomia lineata (DC.) Kuntze, Rev. Gen. 1:196. 1891.

D. arenicola (Vail) Hermann, Jour. Wash. Acad. Sci. 38:237. 1948.

Perennial herb with few to numerous, terete, prostrate or decumbent, trailing, vine-like, finely striate stems about 5-7 dm long or more and often forming a carpet-like mat, arising from a thick-woody tap-root and densely uncinulate-pubescent and uncinulate-puberulent to glabrate. Stipules lance-attenuate or linear-subulate, striate, about 2-4(5) mm long, only moderately persistent. Petioles about (0.2)0.8-2(3) cm long, densely to sparsely short-puberulent and pubescent or nearly glabrous. Leaves pinnately 3-foliolate with the rachis-stalk of the terminal leaflet about 2.5-10 mm long and sparsely to densely puberulent and short-pubescent. Leaflets ovate, rhombic, obovate, broadly elliptic or orbicular, about (0.7)1-2.5(3) cm long and (0.6)1-2(3) cm wide, obtuse to very broadly rounded at the apex and broadly cuneate to rounded at base, usually about three-fourths as wide as long or even wider than long, finely reticulate and glabrous or nearly so to sparsely or even densely uncinulate-pubescent and puberulent on both surfaces; the lateral leaflets very similar to the terminal but somewhat smaller; the petiolules 1-2 mm long, glabrous or nearly so to densely puberulent; stipels short-setaceous

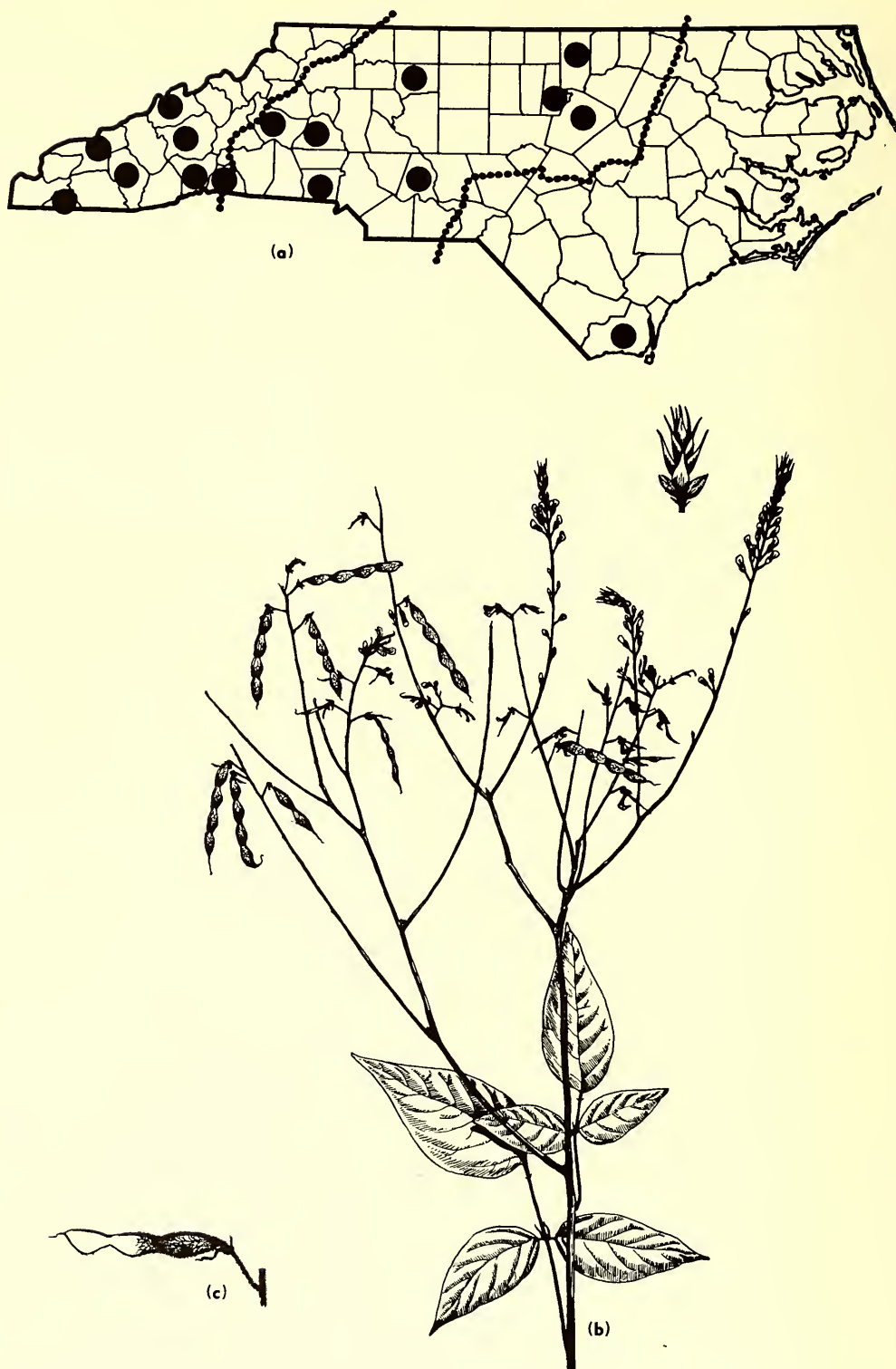


Fig. 70. *Desmodium cuspidatum*. (a) Distribution; (b) Habit sketch; (c) Fruit.

to linear, about 0.5-2 mm long, the larger ones striate. Inflorescence usually elongate, lax, usually much-branched and paniculate, although occasionally simple and racemose, usually terminal but occasionally axillary, mostly 1-3(4) dm long; the axis and branches usually densely uncinulate-puberulent and also more sparingly uncinulate-pubescent. Pedicels ascendent to wide-spreading, about 0.6-1.2(1.6) cm long and densely uncinulate and short-pubescent. Calyx-tube broadly campanulate, about 1 mm high, exceeding or very slightly exceeded by the calyx-lobes, densely puberulent and sparsely short-pubescent. Corolla purplish, about 4-6 mm long. Stamens diadelphous. Stipe of the fruit short, about 1.5-2.2 mm long, exerted from the calyx-tube and about equaling the length of the longest calyx-lobe, exceeded by the remnants of the filaments. Loment-segments (1)2-3(4) in number and each about 3.5-6 mm long and 2.5-3.5 mm wide, obliquely orbicular to obovate, straight to somewhat curved along the upper suture while broadly rounded below, very densely uncinulate-pubescent on both sides and sutures.

DISTRIBUTION: A species of open sandy woods or open places along the Coastal Plain from southeastern Maryland to Florida and west to Texas.

9. *DESMODIUM VIRIDIFLORUM* (L.)
DC., Prodr. 2:329. 1825.

Meibomia viridiflora (L.) Duntze, Rev. Gen. 1:197. 1891.

Perennial herb often becoming somewhat woody at base with stout, erect or strongly ascendent, simple (below the inflorescence) or branched from the base, terete and finely grooved and ridged stems about 0.8-1.8(2) m high, sparsely to densely puberulent and uncinulate-pubescent as well and also occasionally with spreading pilosity intermixed but often becoming glabrate below with age. Stipules lance-ovate and acuminate with truncate base, striate, glabrous or nearly so within, externally densely appressed-pilose, ciliate, mostly 3-5(7) mm long. Petioles striate, usually densely uncinulate-pubescent and also sparsely to densely spreading-pilose, about (0.5)1.5-5(7) cm long. Leaves pinnately 3-foliolate (or rarely 1-foliolate near base) with the rachis-stalk of the terminal leaflet densely uncinulate-pubescent and often pilose as well, about (0.4)0.8-2.0(2.8) cm long. Leaflets rhombic or deltoid, acute or more commonly obtuse to rounded at apex and truncate, cuneate or broadly rounded at base, mostly about (3.5)4-9(11.8) cm long and (2)3-6(9.5)

cm wide, often up to two-thirds as wide as long; the lateral leaflets similar to the terminal but smaller; glabrate to moderately pilose above and densely velvety-tomentose beneath; petiolules densely pubescent or spreading-pilose and mostly about 2-4(5) mm long; stipels persistent, mostly linear-attenuate or subulate, pubescent, (0.5)2-4(6) mm long. Inflorescence loosely branched and paniculate, terminal, mostly 2-5 dm long, with the axis and branches striate and densely puberulent and uncinulate-pubescent. Pedicels uncinulate-puberulent to uncinulate-pubescent, (2.5)3-6(8) mm long, subtended by quickly deciduous, small, triangular, pubescent bractlets about 0.5-1.5 mm long and the 1-3-flowered clusters subtended in turn by an ovate, acute to acuminate, striate, externally pubescent, ciliate bract about 2-4 mm long. Calyx-tube campanulate, 1.5-2 mm high and only slightly to greatly exceeded by the longest calyx-lobe; the calyx sparsely to densely spreading short-pubescent throughout. Corolla pinkish to rose (but reportedly soon turning greenish) and about 5-8(9) mm long. Stamens diadelphous. Stipe of the fruit about 2.5-6 mm long and usually considerably exceeding the length of the calyx-tube but exceeded by the remnants of the filaments. Loment usually straight or nearly so; segments (2)4-5(6) in number and each about (4)5-7(9) mm long and 3.5-5 mm wide, more or less rhomboidal, straight or somewhat angled above with the lower suture bluntly angular to somewhat rounded, moderately to densely uncinulate-pubescent on both sutures and sides.

DISTRIBUTION: A species of dry, open woods and clearings from southern New York south into northern Florida and west into eastern Texas and north in the Mississippi embayment region to Arkansas and Tennessee.

This species has long been confounded with *D. Nuttallii* and nothing has yet appeared in print that gives any promise that the confusion will soon be ended. The two species are very closely related and their distinction often appears of a rather subjective nature.

10. *DESMODIUM NUTTALLII* (Schindl.)
Schub., Rhodora 52:142. 1950.

Meibomia Nuttallii Schindl., Rep. Spec. Nov. 23:354. 1927.

Perennial herb or occasionally becoming somewhat woody at base with erect, stout, simple (or sometimes branching from the base), terete, finely grooved and ridged stems

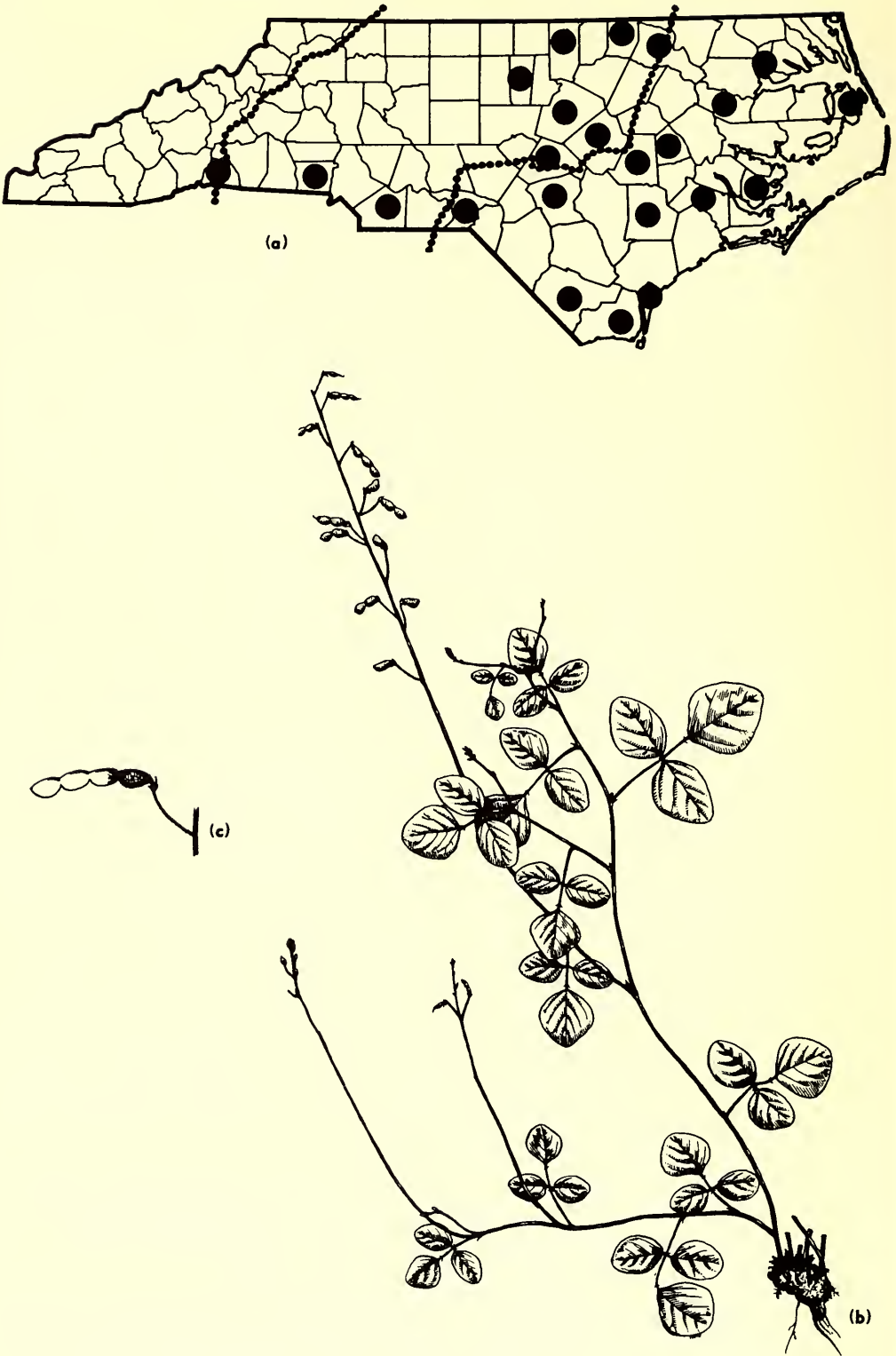


Fig. 71. *Desmodium lineatum*. (a) Distribution; (b) Habit sketch; (c) Fruit.)

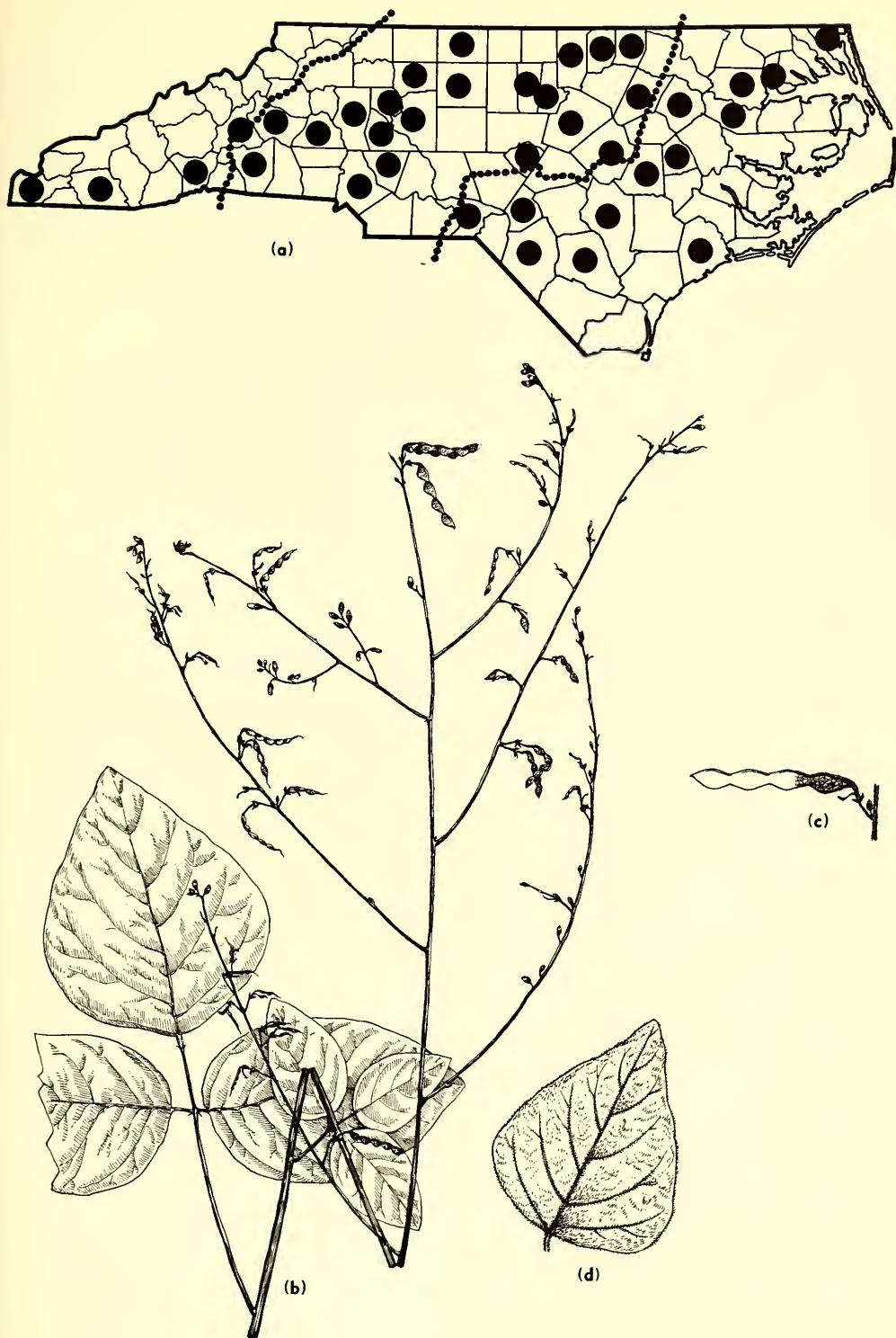


Fig. 72. *Desmodium viridiflorum*. (a) Distribution; (b) Habit sketch; (c) Fruit; (d) Leaflet.

mostly 0.7-1.2(1.5) m high and moderately to more typically densely uncinat-pubescent as well as usually somewhat spreading pilose but often becoming glabrate below with age. Stipules ciliate, acute to acuminate, lanceolate to ovate, truncate or nearly so at base, glabrous or nearly so within while externally more or less appressed-pilose, 3-5(6.5) mm long, soon deciduous. Petioles striate, densely uncinulate-pubescent and sparsely to densely pilose, about 0.5-2.5(3.3) cm long. Leaves pinnately 3-foliolate (or occasionally 1-foliolate near base) with the grooved rachis-stalk of the terminal leaflet densely uncinat-pubescent and usually sparingly to moderately pilose, mostly about 0.5-2(2.3) cm long. Leaflets ovate to rhombic above but mostly elliptic-ovate below with an acute to obtuse apex and the base usually broadly rounded (only rarely cuneate or truncate), mostly (3)4-8(10) cm long and 2.5-5.5 cm wide, usually about one-half as wide as long; the lateral leaflets resembling the terminal but smaller; glabrate to moderately appressed-pilose above and often densely uncinat-pubescent especially near base and densely velvety-tomentose beneath; petiolules densely white-pubescent, mostly 1.5-5 mm long; stipels subulate, more or less persistent, ciliate and also externally pubescent, 1.5-3.5(4) mm long. Inflorescence loosely paniculate, usually terminal, mostly 2-5 dm long, with the axis and branches striate and densely uncinulate-pubescent as well as usually sparsely to moderately pilose. Pedicels uncinulate-pubescent and finely puberulent, (2.5)3.5-6.5 mm long, subtended by deciduous, lance-ovate, pubescent as well as ciliate bractlets (= secondary bracts) about 0.5-1.5 mm long and the 1- to few-flowered clusters subtended by striate, acute, ovate, ciliate, externally pubescent bracts (the primary) mostly 2-4 mm long. Calyx-tube 1.5-2 mm high and slightly to conspicuously exceeded by the longest calyx-lobe; the calyx sparsely to densely spreading short-pubescent throughout. Corolla pinkish to rose and about 4-7 mm long. Stamens diadelphous. Stipe of the fruit 2.5-4 mm long, exceeding the length of the calyx-tube but exceeded by the remnants of the filaments. Loment often more or less arching; segments (1)2-4 in number and each about 4-5(7) mm long and 3-4.5 mm wide, rounded both above and below but less so above, moderately to densely uncinulate-pubescent on both sutures and sides.

DISTRIBUTION: A species of usually dry, open, sandy woods from southern New York west to Illinois and south into northern Florida and eastern Texas.

This species and *D. viridiflorum* are very closely related and are easily confused.

Both Schubert and Isely (1953) consider the two as distinct species while Gleason (2:431. 1952) concluded that the "two forms seem to be merely fluctuations within a single species" which he chose not to formally designate. This perplexing group obviously requires additional collecting and study and so the present treatment collated from Schubert and to some extent from Isely can only be considered as tentative.

11. DESMODIUM TORTUOSUM (Sw.) DC., Prodr. 2:332. 1825.

Meibomia tortuosa (Sw.) Kuntze, Rev. Gen. 1:198. 1891.

Meibomia purpurea (Mill.) Vail ex Small, Fl. SE. U. S. 639. 1903.

Annual from a taproot with an erect, finely striate, terete stem about 0.5-1.5 m high (or reportedly up to 3.5 m high) and usually much-branched at least so above and often somewhat woody at base, usually densely short uncinat-pubescent and in addition with straight, spreading-pilose trichomes intermixed. Stipules striate, rather long-persisting, obliquely obovate- to lance-attenuate, about 0.5-1(1.5) cm long, glabrous or nearly so except for the ciliate margins. Petioles about 0.5-3(4.5) cm long and usually densely uncinulate-puberulent or short uncinat-pubescent and often with a sparse intermixture of pilose trichomes. Leaves pinnately 3-foliolate (the lower sometimes 1-foliolate) and with the rachis-stalk of the terminal leaflet mostly 0.5-2 cm long. Leaflets elliptic, oblong-elliptic to oblong or ovate or ovate-oblong, with (2)3-8(14) cm long and (0.7)1-3(6.5) cm wide, usually obtuse to broadly rounded at the apiculate or mucronulate apex, cuneate to rounded at base; the lateral leaflets similar to the terminal but smaller; sparingly appressed, short-puberulent above to glabrate, sparingly to densely appressed short-pubescent below; petiolules moderately to densely spreading short-pubescent to pilose, about 1-3 mm long; stipels persisting, linear-subulate to setaceous, ciliate, the larger often noticeably striate, 1-6 mm long. Inflorescence terminal or from the upper axils, simple and racemous or branched and paniculate, about 1.5-3 dm long and with the axis and branches densely uncinulate-puberulent or uncinulate-pubescent and often sparsely to densely short-pilose. Pedicels slender, filiform, mostly 1-2 cm long and usually moderately to densely short-pubescent to short-pilose with many of the trichomes with swollen bases, subtended by caducous, linear to filiform bractlets (= sec-

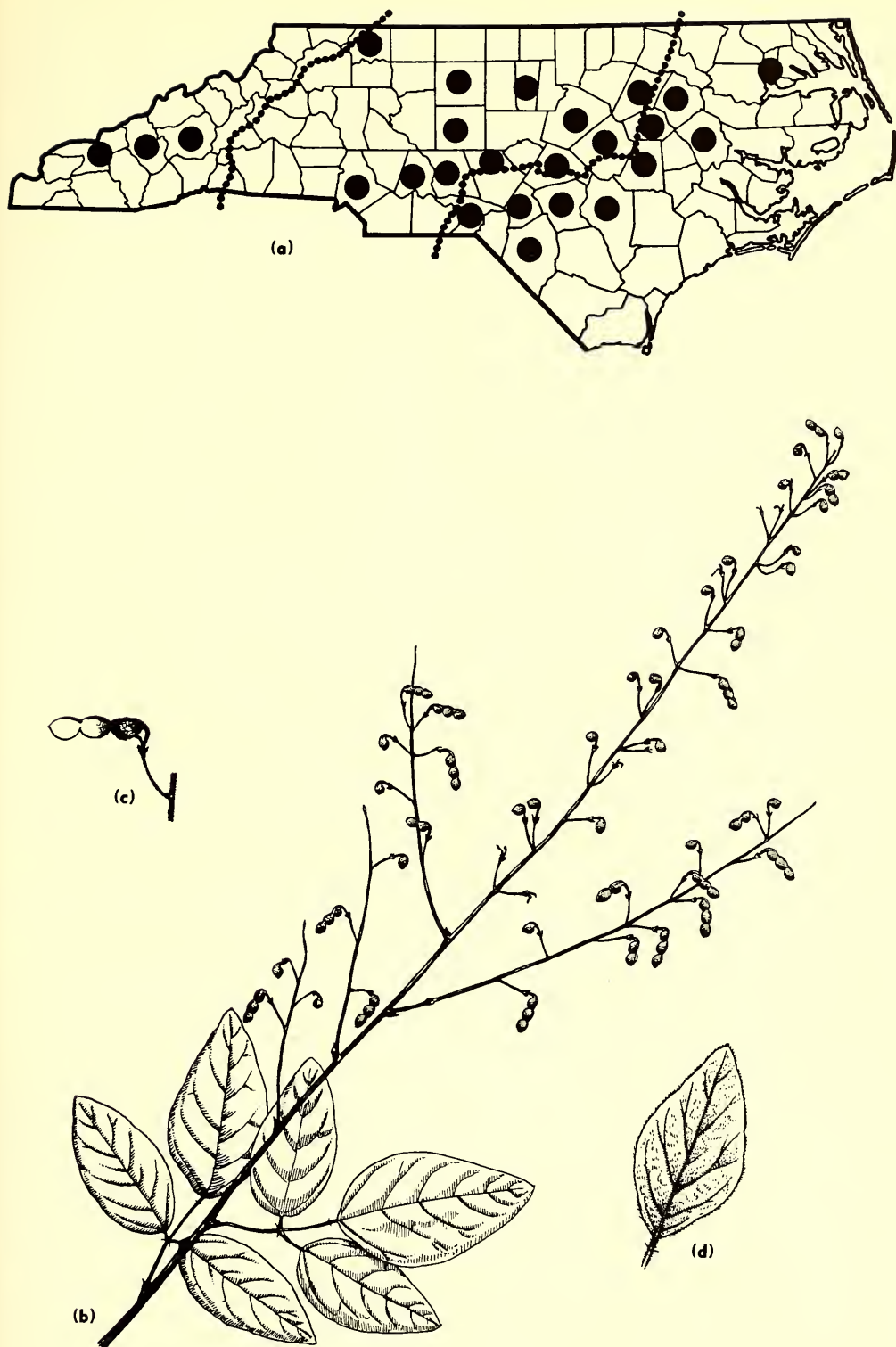


Fig. 73. *Desmodium Nuttallii*. (a) Distribution; (b) Habit sketch; (c) Fruit; (d) Leaflet.

ondary bracts) 1-2.5 mm long and the flower-clusters themselves by caducous, narrowly lanceolate-attenuate, striate, pubescent primary bracts about 4-6 mm long. Calyx-tube narrowly campanulate or cylindrical, about 0.5-0.8 mm long and usually exceeded by all of the calyx-lobes of which the longest is about 2-2.5 mm long; the calyx densely short-pubescent to pilose. Corolla purple or bluish-purple, about 5-7 mm long. Stamens diadelphous. Stipe of fruit short, about 1-1.2 mm long and mostly included within the calyx-tube and exceeded by both the calyx-lobes and remnants of the filaments. Loment-segments conspicuously contorted or twisted while young, (2)3-6(7) in number, mostly about 3-5 mm long and 3-4 mm wide, oval to suborbicular with the connective medial, the upper and lower indentations about equal and with both sutures and sides densely uncinulate-puberulent.

DISTRIBUTION: An introduced species which is reportedly an excellent forage plant. Perhaps a native of the West Indies but found in Mexico, Central and South America as well as in the Old World; in the Southeast it is known from North Carolina south to Florida and along the Gulf Coast into Texas.

12. DESMODIUM SESSILIFOLIUM (Torr.) T. & G., Fl. N. Am. 1:363. 1840.

Meibomia sessilifolia (Torr.) Kuntze, Rev. Gen. 1: 198. 1891.

Erect, perennial herb with 1 to few, simple (or rarely branching below the inflorescence), terete to inconspicuously angled stems about 0.6-1.0(1.2) m high, densely and conspicuously pubescent with uncinulate-puberulence, short uncinulate-pubescent and occasionally when young also very sparsely pilose especially near the nodes. Stipules lance-attenuate, striate, soon deciduous, ciliate and short-pubescent to almost pilose, (3)4-7(9.5) mm long. Petioles very short or even apparently lacking, mostly 1-3(4) mm long, densely covered with stout, uncinulate to uncinulate pubescence. Leaves pinnately 3-foliolate with the rachis-stalk of the terminal about 2-5 mm long and densely uncinulate-puberulent. Leaflets elliptic-lanceolate, commonly 4-6(10)-times as long as wide, mostly (2.5)3-6(7.3) cm long and (4.5)6-12(14) mm wide, narrowing to the somewhat obtuse and mucronulate apex and more or less rounded at base, noticeably reticulate, moderately to densely uncinulate-puberulent and sparsely to moderately short-pubescent above and moderately

to densely short-pubescent below as well as moderately uncinulate-puberulent along the mid-vein; petiolules about 0.5-1.0 mm long and densely short-pubescent; stipels persisting, short-setaceous, about 0.7-1.2 mm long. Inflorescence paniculate, terminal, about 1.5-4 dm long with the axes densely uncinulate-puberulent as well as uncinulate-pubescent and occasionally sparsely short-pilose. Pedicels stout, straight, stiffly ascendent, about 1.5-4.5 mm long, densely uncinulate-puberulent and pubescent, subtended by a small, subulate, short-ciliate, quickly deciduous bractlet (= secondary bract) about 0.6-0.8 mm long and the cluster of usually (1)2-3 flowers subtended by a caducous, ovate, acuminate, short-pilose, primary bract about 1.5-2.2 mm long. Calyx-tube campanulate, about 1-1.2 mm long, about once to twice as long as the short, deltoid-triangular lobes; the calyx moderately to densely short-pubescent. Corolla small, about 4-6 mm long, pinkish to lavender (or creamy white *vide* Fox 5434). Stamens diadelphous. Stipe of the fruit 1.2-3 mm long, equaling or barely exceeding the calyx and considerably exceeded by the remnants of the filaments. Loment-segments 1-3(4) in number and each about 4-6 mm long and 3-4.5 mm wide, semi-orbicular, convexly curved above and rounded below (*i.e.* the lower side more rounded), very densely uncinulate-puberulent on both sides and sutures.

DISTRIBUTION: A species of dry, sandy soils and reportedly rather local from Massachusetts west into Michigan to Kansas and south into South Carolina and eastern Texas.

This is apparently our rarest species and is represented from North Carolina by only one collection.

13. DESMODIUM TENUIFOLIUM T. & G., Fl. N. Am. 1:363. 1840.

Meibomia tenuifolia (T. & G.) Kuntze, Rev. Gen. 1:198. 1891.

Perennial, erect herb with 1 to few, simple or branched, terete to inconspicuously angled stems about 0.5-1(1.2) m high, densely but inconspicuously uncinulate-puberulent and sparsely uncinulate-pubescent and usually becoming glabrate below. Stipules linear to linear-subulate, deciduous, about 2-4(5) mm long. Petioles (0.1)0.4-1(1.7) cm long, those of the median and upper leaves usually less than 6 mm long, glabrous or sparsely to densely puberulent. Leaves pinnately 3-foliolate with the rachis-stalk of the terminal leaflet about 2-8 mm long and glabrous to very sparsely

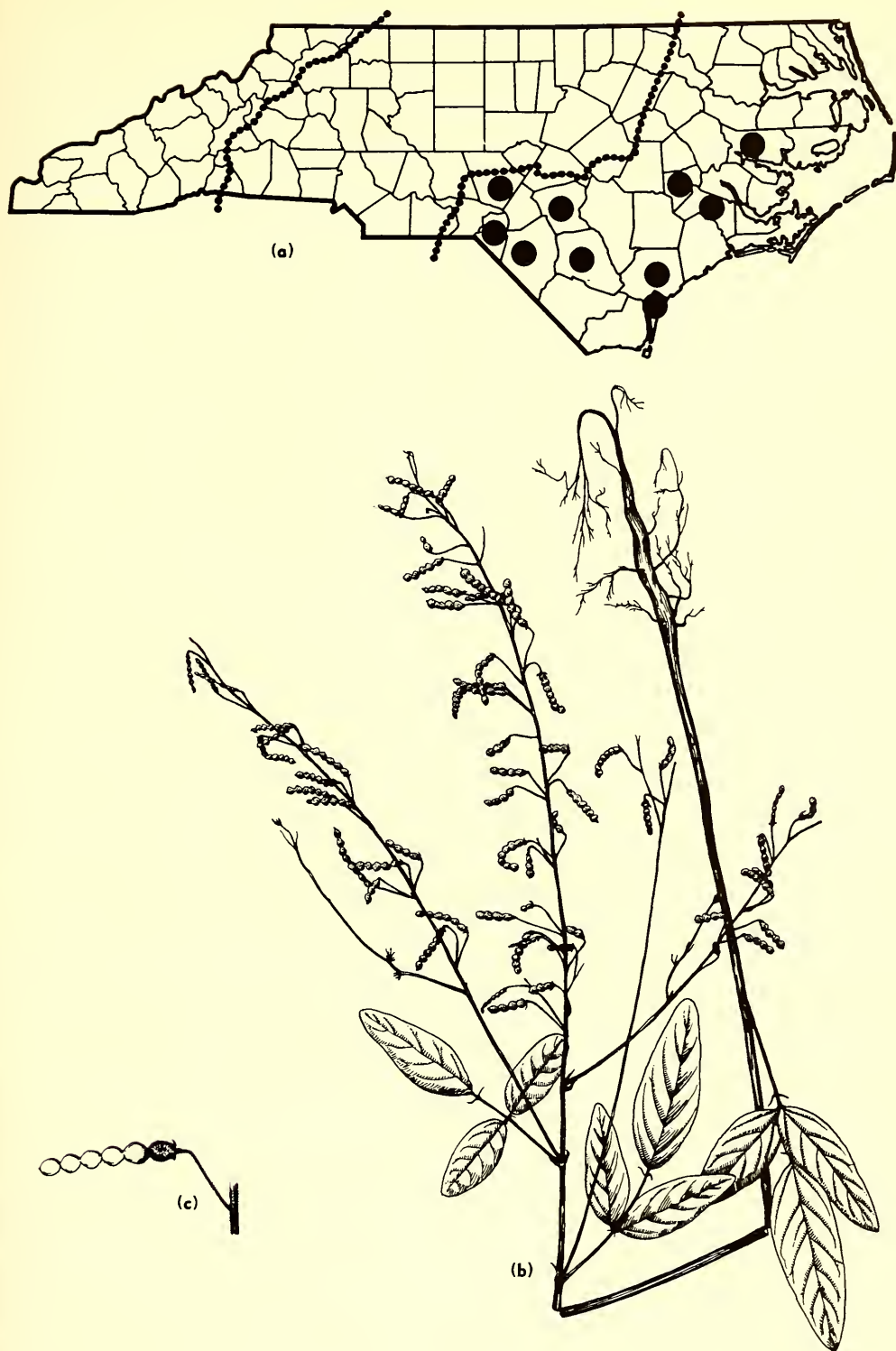


Fig. 74. *Desmodium tortuosum*. (a) Distribution; (b) Habit sketch; (c) Fruit.

puberulent. Leaflets very narrowly linear, commonly 8-15-times or more as long as broad, (2.5)4-6(8) cm long and 3-6(8) mm wide, obtuse or rounded at the mucronulate apex, rounded to somewhat tapering at base, glabrous to very minutely puberulent above while below sparsely short-pubescent especially along the veins, both surfaces noticeably reticulate; the lateral leaflets very similar except somewhat smaller; the petiolules about 0.7-1.2 mm long, glabrate to minutely puberulent; stipels persisting, short-setaceous, about 0.5-1(1.5) mm long. Inflorescence usually much-branched and paniculate or rarely unbranched and racemose, usually terminal and about 2-4 dm long with the axis and branches densely uncinulate-puberulent. Pedicels slender but straight, spreading to ascending, about 4-8(10) mm long, densely uncinulate-puberulent and subtended by a small, triangular, quickly deciduous bractlet and the cymule of usually 2-3 flowers subtended by a caducous, ovate, acute to acuminate bract of about 1-2.5 mm long. Calyx-tube campanulate, about 1 mm long or about twice as long as the triangular lobes; the calyx minutely but densely puberulent and also with sparse, ascending short-pubescent. Corolla small, about 4-5 mm long, pinkish to purplish. Stamens diadelphous. Stipe of the fruit 1-2 mm long, equaling or barely exceeding the calyx and exceeded by the remnants of the filaments. Loment-segments 1-3 in number and each about 3.5-5 mm long and 2.5-3.5 mm wide, semi-orbicular to semi-elliptic, and very densely uncinulate-puberulent on both sides and sutures; upper margin of the loment-segment slightly convex or bulging outwards.

DISTRIBUTION: A species of savannas along the coastal plain from southeastern Virginia south to northern Florida and west to Alabama.

14. *DESMODIUM STRICTUM* (Pursh)
DC., Prodr. 2:329. 1825.

Meibomia stricta (Pursh) Kuntze, Rev. Gen. 1:198. 1891.

Perennial, erect herb with 1 to few, simple or branched, terete to inconspicuously ridged stems about 0.5-1(1.2) m high, sparsely to densely but inconspicuously uncinulate-puberulent or short-pubescent and usually becoming glabrate below. Stipules linear-subulate, persisting or soon deciduous, mostly 2-4 mm long. Petioles mostly 0.5-1.5(2.5) cm long, those of the median and upper leaves often 1 cm or more in length, glabrous or nearly so to minutely or even densely uncinulate-puberulent. Leaves pinnately 3-foliolate with the

rachis-stalk of the terminal leaflet about 4-8 mm long and glabrous to uncinulate-puberulent. Leaflets linear or less commonly oblong, often about (4)6-10-times as long as wide, usually 3-5(7) cm long and 3-7 mm wide, obtuse or rounded at the mucronulate apex, rounded or somewhat tapering at the base, both surfaces glabrate or minutely puberulent or sparingly short-pubescent especially beneath along the veins and margin and finely reticulate above and below; the lateral leaflets similar but usually somewhat smaller; the petiolules about 1 mm long and minutely puberulent or sparsely short-pubescent; stipels persistent, short-setaceous, about 0.5-1(1.2) mm long. Inflorescence usually much-branched and paniculate or rarely unbranched and then racemose, usually terminal, the branches ascending but often widely divergent, about 2-4 dm long with the axis and branches densely uncinulate-puberulent. Pedicels slender, but stiffly ascending, about (4)6-11 mm long, densely uncinulate-puberulent and subtended by a small, quickly deciduous triangular bractlet. Calyx-tube campanulate, about 1 mm high and about as long as the shorter calyx-lobes and slightly exceeded by the longer, densely but very minutely puberulent and sparsely short-pubescent. Corolla small, purplish, about 3-5 mm long. Stamens diadelphous. Stipe of the fruit about 1-2 mm long and about equaling the height of the calyx but exceeded by the remnants of the filaments. Loment-segments 1-3 in number, usually 1 or 2, and each about 4-6 mm long and 3-4 mm wide, semi-orbicular or semi-obovate, with the lower margin rounded and the upper margin of the segments flat or slightly concave (*i.e.* indented.)

DISTRIBUTION: A species of dry, open, sandy barrens and piney woods mostly along the coastal plain from New Jersey south into Florida and west into Louisiana.

15. *DESMODIUM CILIARE* (Muhl. ex Willd.) DC., Prodr. 2:329. 1825.

Meibomia ciliaris (Muhl. ex Willd.) Blake, Bot. Gaz. 78:275. 1924.

Perennial herb with erect to strongly ascending, solitary to several, usually branched, terete to somewhat angulate stems about 0.4-1 m high with low-ridges and broad shallow grooves and sparsely to moderately uncinulate-puberulent or short-pubescent and always sparingly to densely pilose. Stipules linear-subulate to lance-attenuate, usually long-persistent, striate, about 2-4(5) mm long. Petioles usually very short, often subsessile or mostly 0.1-1.0 cm long, although occasion-

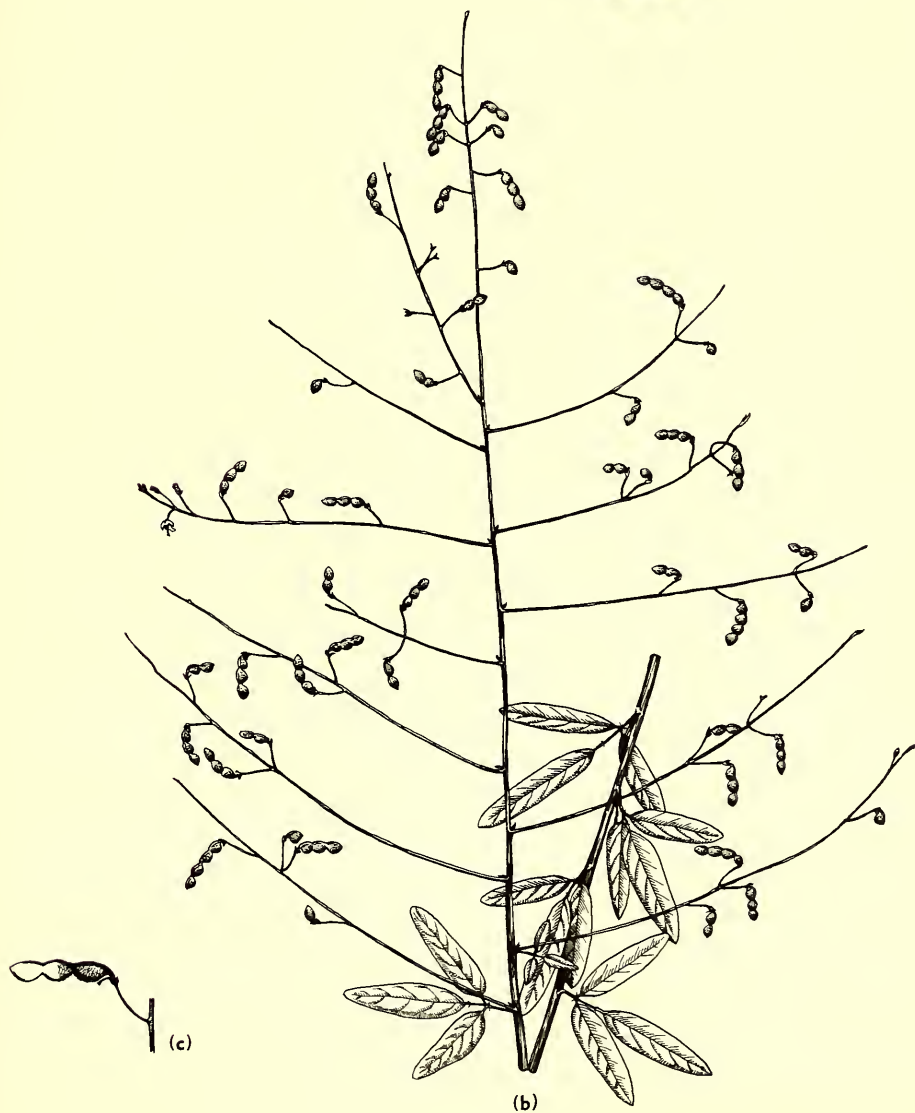
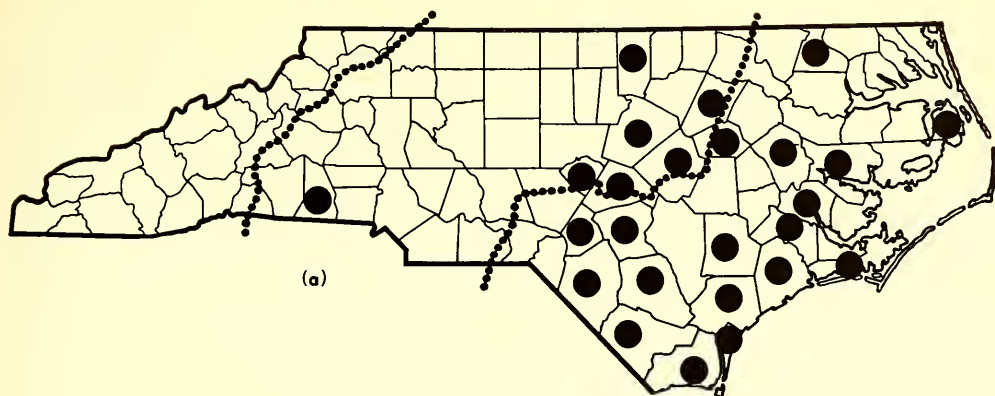


Fig. 75. *Desmodium tenuifolium*. (a) Distribution; (b) Habit sketch; (c) Fruit.

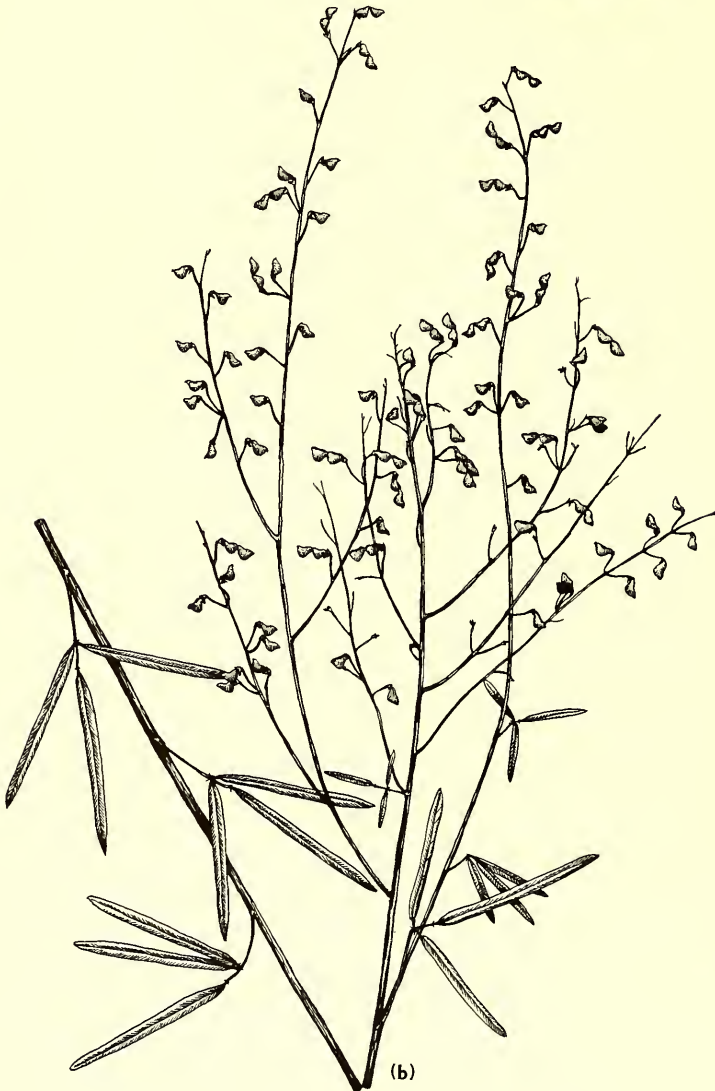
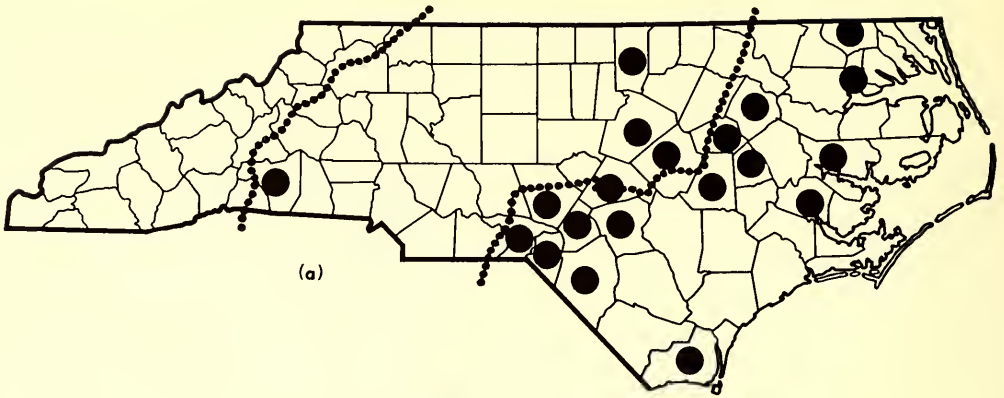


Fig. 76. *Desmodium strictum*. (a) Distribution; (b) Habit sketch; (c) Fruit.

ally the lowermost primary leaves with petioles up to 1.5 or even 2 cm long, usually shorter than the width of the lateral leaflets and almost always much shorter than the length of those leaflets, densely puberulent and sparingly to abundantly pilose. Leaves pinnately 3-foliolate with the rachis-stalk of the terminal leaflet mostly 2-5(9) mm long and densely puberulent and pilose. Leaflets elliptic to oblong-elliptic or even ovate or approaching orbicular, obtuse to very broadly rounded at the minutely mucronulate apex, broadly rounded at the base, about 1-2.5(3) cm long and 0.5-1.2(1.7) cm wide, usually about 1.5-2.5-times as long as wide, sparsely to abundantly pilose on both surfaces and usually more so above than below or becoming glabrate; the lateral leaflets similar to the terminal but smaller; the petiolules 1-2 mm long and copiously pilose; stipels about 0.8-1(1.2) mm long, persistent, short-setaceous. Inflorescence elongate, lax, usually much-branched and loosely paniculate, more rarely unbranched and racemose, terminal, mostly 2-4 dm long; the axis and branches very sparsely to moderately uncinulate-puberulent to uncinulate-pubescent or sometimes glabrous or nearly so. Pedicels ascendent, about (2)4-9 mm long, sparsely to densely puberulent and uncinulate-pubescent. Calyx-tube broadly campanulate, about 1-1.5 mm high, slightly exceeding or equaling the four shorter lobes but usually slightly exceeded by the longest lobe, densely minute-puberulent and sparsely to moderately short-pubescent. Corolla pink to purplish, about 3-5 mm long. Stamens diadelphous. Stipe of the fruit short, about 1-2 mm long, mostly included within the calyx-tube and scarcely, if ever, exceeding the lobes in length, exceeded by the remnants of the filaments. Loment-segments 1-2(3) in number and each about 3.5-5(6) mm long and about 2.8-4 mm wide, semi-obovate, very slightly curved or arched along the upper suture while broadly rounded below, very densely uncinulate-puberulent or short uncinulate-pubescent on both sides and sutures.

DISTRIBUTION: A common species of dry and often sandy woods and clearings from Massachusetts and Michigan south into Florida and eastern Texas.

16. *DESMODIUM MARILANDICUM* (L.)
DC., Prodr. 2:328. 1825.

Meibomia marilandica (L.) Kuntze, Rev.
Gen. 1:198. 1891.

Perennial herb with erect or strongly as-

cent, solitary to few, unbranched or but little branched (at least below the inflorescence), terete to angulate, striate (at least above) stems about 0.6-1.2(1.5) m high and glabrous or sparsely uncinulate-puberulent or short-pubescent below the inflorescence and lacking pilose trichomes. Stipules narrowly linear to setaceous, glabrous to minutely puberulent, striate, caducous or at least usually soon deciduous, about (2)3-5 mm long. Petioles (0.2)0.8-1.6(2.7) cm long, glabrous or nearly so to inconspicuously uncinulate-puberulent or sparsely short-pubescent. Leaves pinnately 3-foliolate with the rachis-stalk of the terminal leaflet about (0.2)0.4-0.8(1.2) cm long and glabrous or but sparsely puberulent. Leaflets ovate to almost orbicular or commonly oblong, oblong-elliptic to elliptic, obtuse to rounded at the minutely mucronulate, often somewhat retuse apex and broadly rounded to truncate or occasionally somewhat cordate at base, about (1)1.5-2.5(5) cm long and (0.6)1-2(2.6) cm wide, mostly about 1.5-2.2-times as long as broad, both surfaces glabrous or very nearly so to moderately short-pubescent beneath; lateral leaflets very similar to the terminal but smaller; petiolules about 1-2 mm long and glabrous to sparsely short-pubescent; stipels persistent, setaceous to very narrowly linear, about 1-2 mm long. Inflorescence usually terminal but occasionally from the upper axils, usually loosely branching and paniculate although rarely racemose, mostly about 2-4 dm long with the axis and branches glabrous or nearly so to moderately uncinulate-puberulent. Pedicels strongly spreading to ascendent, about 0.5-1.5(1.9) cm long, densely but minutely uncinulate-puberulent and each subtended by a caducous, very narrowly linear to setaceous, minutely puberulent bractlet (= secondary bract) about 0.8-1(1.2) mm long and the 1- to few-flowered clusters subtended by a striate, ovate, acuminate, puberulent, caducous bract of about 1.5-2.2 mm long. Calyx-tube campanulate, about 0.8-1 mm long and with the calyx-lobes about equaling to at most but slightly exceeding the tube, minutely puberulent and sparsely to moderately short-pubescent especially above and on the lobes. Corolla purplish, about 4-6 mm long. Stamens diadelphous. Stipe of the fruit mostly 1.5-2.5 mm long and equaling or nearly equaling or even exceeded in length by the calyx and greatly exceeded by the remnants of the filaments. Loment-segments 1-3 in number and each about 3.5-5.5 mm long and 3-4 mm wide, semi-obovate, slightly convex to almost straight along the upper suture and broadly rounded below, densely uncinulate-puberulent on both sides and sutures.

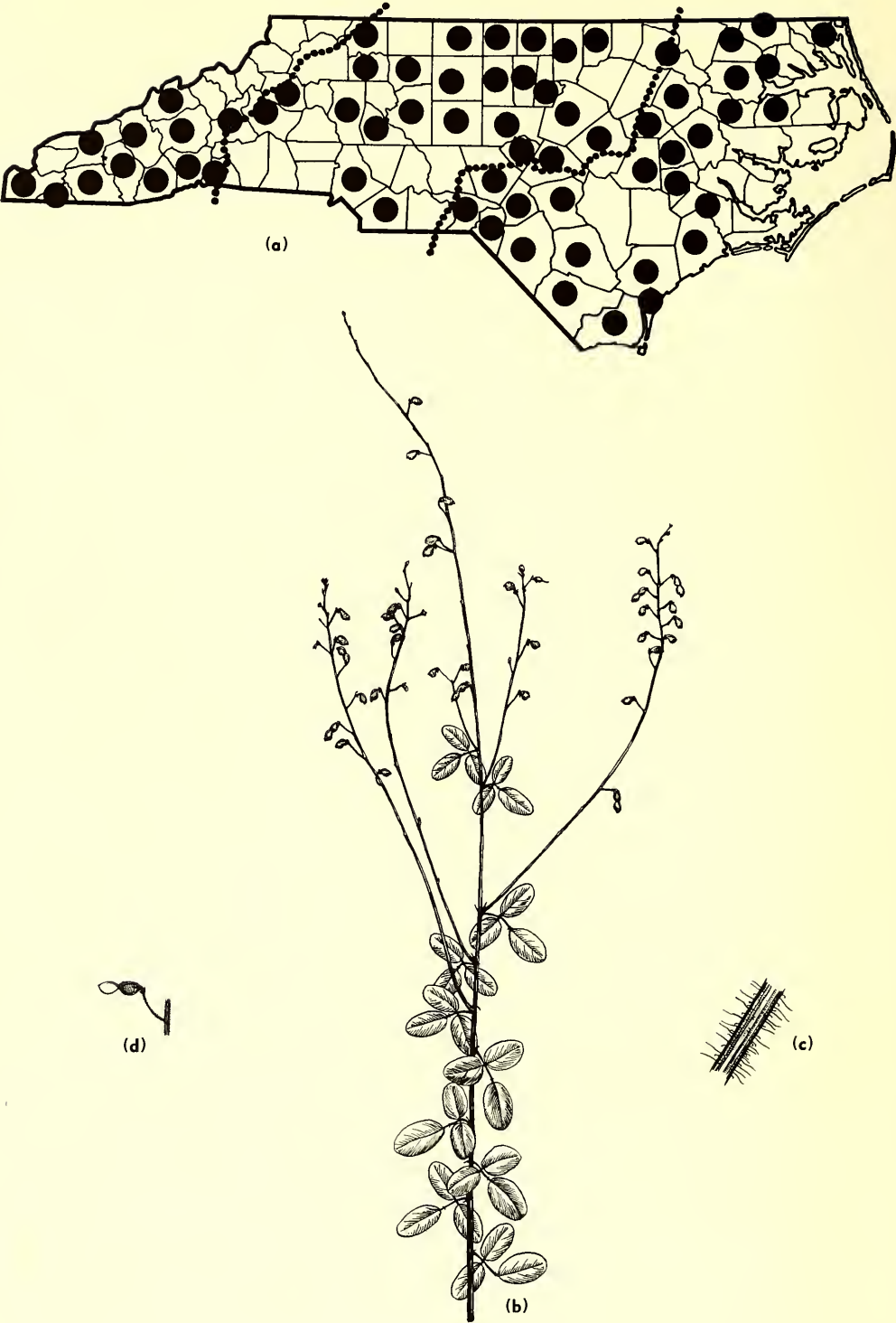


Fig. 77. *Desmodium ciliare*. (a) Distribution; (b) Habit sketch; (c) Enlarged section of stem; (d) Fruit.

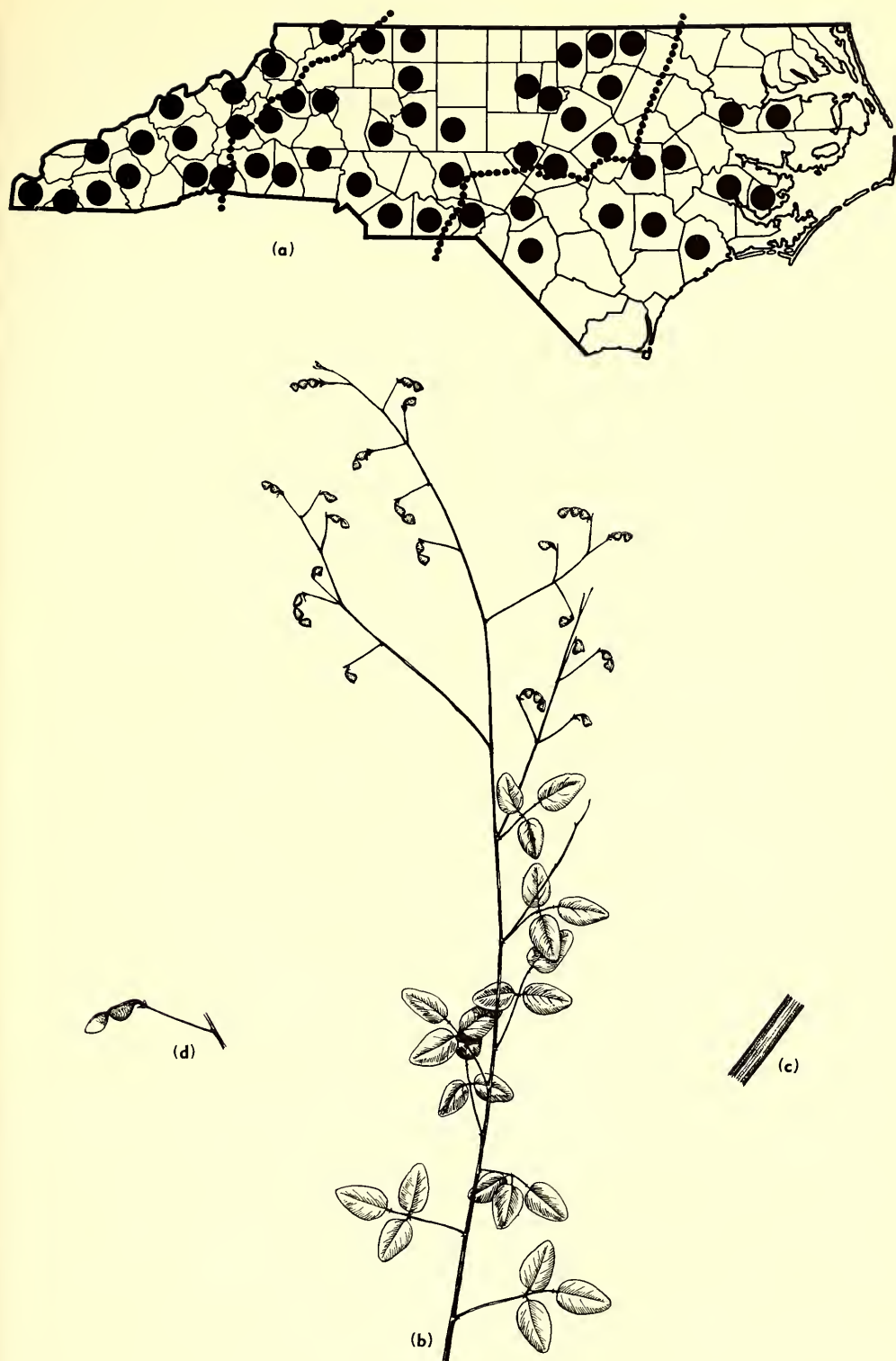


Fig. 78. *Desmodium marilandicum*. (a) Distribution; (b) Habit sketch; (c) Enlarged section of stem; (d) Fruit.

DISTRIBUTION: A wide-ranging species throughout much of the eastern United States from Massachusetts to Michigan and south into Florida and eastern Texas.

17. **DESMODIUM OBTUSUM** (Muhl. ex Willd.) DC., Prodr. 2:329. 1825.

Hedysarum obtusum Muhl. ex Willd., Sp. Pl. 3:1190. 1803.

Hedysarum rigidum Ell., Bot. S. C. & Ga. 2:215. 1824. Type seen!

D. rigidum (Ell.) DC., Prodr. 2: 330. 1825.

Meibomia rigida (Ell.) Kuntze, Rev. Gen. 1:198. 1891.

Meibomia obtusa (Willd.) Vail, Bull. Torrey Club 19:115. 1892.

Perennial herb with erect to strongly ascending, solitary to few, usually unbranched or but little branched below the inflorescence, terete to angulate, striate stems and about 0.5-1.2 m high and very densely and coarsely uncinately pubescent and without pilose trichomes. Stipules mostly lance-attenuate to ovate-lanceolate, quickly deciduous, striate, ciliate and pubescent externally and also internally, about (2)3-5(6) mm long. Petioles usually very short, (the leaves subsessile or shortly petiolate) and, mostly (0.2)0.5-2(2.5) cm long and typically exceeded by the length of the lateral leaflet and often by its width, very densely uncinulate-puberulent or uncinately pubescent. Leaves pinnately 3-foliolate with the rachis-stalk of the terminal leaflet about 0.2-1 (1.5) cm long and usually densely uncinately puberulent or short-pubescent. Leaflets short-ovate or almost orbicular or most commonly oblong-ovate or oblong-elliptic or even oblong to elliptic, obtuse or rounded at the minutely to conspicuously mucronulate to apiculate apex and usually broadly rounded at base, about (0.8)2-3.5(4.5) cm long and (0.7)1-1.8(2) cm wide, mostly about (1.2)1.8-2.2-times as long as wide, short-puberulent to short-pubescent or becoming glabrate above with the lower surface often reticulate and sparsely to densely short-pubescent; lateral leaflets similar to the terminal but smaller; petiolules about 1-3 mm long and sparsely to densely short-pubescent; stipels persistent, short setaceous to narrowly linear, about 1-3 mm long. Inflorescence terminal or from the upper axils, usually loosely branching and paniculate, rarely simple and racemose, mostly 1.5-4 dm long with the axis and branches usually very densely uncinulate-puberulent or uncinately pubescent. Pedicels ascending, mostly 4-12(17) mm long, densely uncinulate-puberulent or uncinately pubescent with each sub-

tended by a caducous, narrowly linear, pubescent, secondary bract (= bractlet) about 1-1.5 mm long and the flower-clusters subtended by an ovate, striate, pubescent, caducous bract about 2-3 mm long. Calyx-tube campanulate, about 1.2-1.5 mm long and 1.5-2-times exceeded by the length of the longest lobe and equaled or nearly so by the shorter lobes, ascendent-spreading or appressed pubescent to short-pilose especially above and on the lobes. Corolla purplish and about 4-6 mm long. Stamens diadelphous. Stipe of the fruit mostly 1.5-2.5(3.5) mm long and exceeding the calyx-tube but exceeded by the longest lobe and the remnants of the filaments. Loment-segments 1-3(4) in number and each about 3-5 mm long and 2.5-3.5 mm wide, slightly semi-obovate to almost orbicular, very slightly convex along the upper suture and broadly rounded below, densely uncinulate-puberulent on both sides and sutures.

DISTRIBUTION: A species of dry, open and often sandy woods from Massachusetts to Michigan and south to eastern Texas and Florida.

The identity of *Hedysarum obtusum* has been long a source of confusion as the name has been used for or placed in synonymy with several closely related species. The plant with which the name is here applied has been usually referred to as *D. rigidum* while in the past at various times it has been linked with *D. ciliare* as well as *D. marilandicum*. Dr. Bernice Schubert (litt.) now employs this name for that group which she called *D. rigidum* in 8th edition of Gray's Manual.

18. **DESMODIUM PANICULATUM** (L.) DC., Prodr. 2:329. 1825.

Meibomia paniculata (L.) Kuntze, Rev. Gen. 1:198. 1891.

Perennial herb with one or less commonly several, slender to stout, finely lined to striate, terete to strongly angulate (at least above), erect to strongly ascendent and above typically much-branched stems about 0.5-1(1.2) m high, usually glabrous or very nearly so, or rarely very sparsely to moderately uncinulate-puberulent or very sparingly short-pilose. Stipules narrowly linear to lance-attenuate, finely striate, about 3-5(6) mm long, usually quickly deciduous typically at or before anthesis. Petioles (0.2)1-3.5(5.3) cm long and usually glabrous or very nearly so to sparsely puberulent, broadly and shallowly grooved above. Leaves pinnately 3-foliolate with the



Fig. 79. *Desmodium obtusum*. a) Distribution; (b) Habit sketch; (c) Enlarged section of stem; (d) Fruit.

rachis-stalk of the terminal leaflet grooved above, glabrous to sparingly puberulent, about (0.2)0.4-1.2(1.5) cm long. Leaflets linear-lanceolate, linear-oblong, lanceolate or narrowly ovate-lanceolate, acute to obtuse at apex and rounded at base, about (2.0)3.5-7(10) cm long and (0.6)1-2(2.5) cm wide, usually about 3-6(9)-times as long as wide; the lateral leaflets smaller but otherwise quite similar to the terminal; both surfaces glabrous or very nearly so or sparsely to moderately appressed puberulent or appressed short-pubescent; petiolules glabrous or nearly so to moderately spreading short-pubescent, about 1-2.5 mm long; stipels persistent, setaceous, 1-2(3) mm long. Inflorescence usually a terminal, loosely much-branched, large panicle (or less commonly axillary) and usually (1)2-4 dm long with the axis and branches glabrous or nearly so to sparsely to densely uncinulate-puberulent and occasionally with a sparse intermixture of short-pilose or short-pubescent trichomes. Pedicels slender, short to elongate, about (3)5-10(12) mm long, glabrate or more commonly sparsely to densely uncinulate-puberulent, subtended by a minute, narrowly linear, caducous bractlet about 0.5-1 mm long and each 1- to few-flowered cluster subtended by an ovate-lanceolate, acuminate, striate, ciliate, caducous bract of about 1.5-2.2 mm long. Calyx-tube broadly campanulate, about 1-1.7 mm long, equaling or nearly so the length of the four shorter lobes but considerably exceeded by the longest lobe; calyx glabrous or more commonly puberulent and with spreading short-pilosity especially on the lobes. Corolla purplish, about 6-8 mm long. Stamens diadelphous. Stipe of the fruit 2-3.5 mm long, exceeding the calyx-tube and often the lobes but exceeded by the remnants of the filaments. Loment-segments (1)3-5(6) in number and each about 5-7 mm long and 3.5-4.5 mm wide, usually triangular to semi-rhombic, with the upper suture straight to slightly outwardly angled or even somewhat curved and the lower suture typically abruptly angled but rarely rounded, densely uncinulate-puberulent on both sides and sutures.

DISTRIBUTION: A very widespread species of dry or rarely even wet openings and woods from New Hampshire west into Michigan and Kansas and south into Florida and Texas.

A puzzling variant of this species has been designated by Schubert as var. *epetiolatum*. As the name indicates much of the supposed diagnostic character of this variant rested upon the sessile or short-petiolate principal cauline leaves.

There really seems to be no sound way to divide this species if one primarily depends upon the length of the petiole as it presents a picture of continuous variation. However, Schubert also pointed out that var. *epetiolatum* has rounder loment-segments than the sharply angular segments of her var. *paniculatum*. This does appear to delimit a striking variant which, from the few specimens which I have seen, is characteristically more pubescent.

19. *Desmodium laevigatum* (Nutt.) DC., Prodr. 2:329. 1825.

Meibomia laevigata (Nutt.) Kuntze, Rev. Gen. 1:198. 1891.

Perennial herb with erect or strongly ascending, often stout, finely lined or striate, simple to much-branched, terete stems about 0.5-1(1.2) m high, sparsely and inconspicuously uncinulate-puberulent or more commonly glabrate (or perhaps even glabrous) especially below. Stipules caducous, lance-attenuate, about 5-8 mm long. Petioles very sparsely uncinulate-puberulent to glabrate, about (1.2)2-5(6.6) cm long. Leaflets pinnately 3-foliolate with the rachis-stalk of the terminal leaflet glabrous to very sparsely puberulent, about (0.8)1.2-2(2.8) cm long. Leaflets ovate, elliptic-ovate or even elliptic-oblong, usually obtuse or even rounded or acute at the mucronulate (and occasionally retuse) apex, truncate or broadly rounded to cuneate at base, about (3)4-7(9) cm long and 2-5 cm wide, mostly about two- to four-fifths as wide as long; the lateral leaflets quite similar to the terminal but smaller; upper surface glabrous or very sparsely puberulent, lower surface glabrous or very sparingly puberulent or short-pilose and this pubescence usually restricted to the principal veins, often glaucous beneath, margins often very slightly revolute; petiolules glabrate to sparsely or even moderately uncinulate-puberulent, about 2-4 mm long; stipels narrowly linear-lanceolate, long-persistent, about 1-3 mm long. Inflorescence usually terminal, much-branched and paniculate or occasionally from the upper axils and then racemose, mostly 2-4 dm long. The axis and branches terete and often striate (especially above) and moderately to densely uncinulate-puberulent. Pedicels slender, elongate, wide-spreading, glabrescent to densely and minutely uncinulate-puberulent, mostly (0.7)1-1.5(1.9) cm long with each subtended by a caducous, linear, puberulent bractlet (= secondary bract) about 0.8-1.5(2) mm long and the few-flowered clusters subtended by an

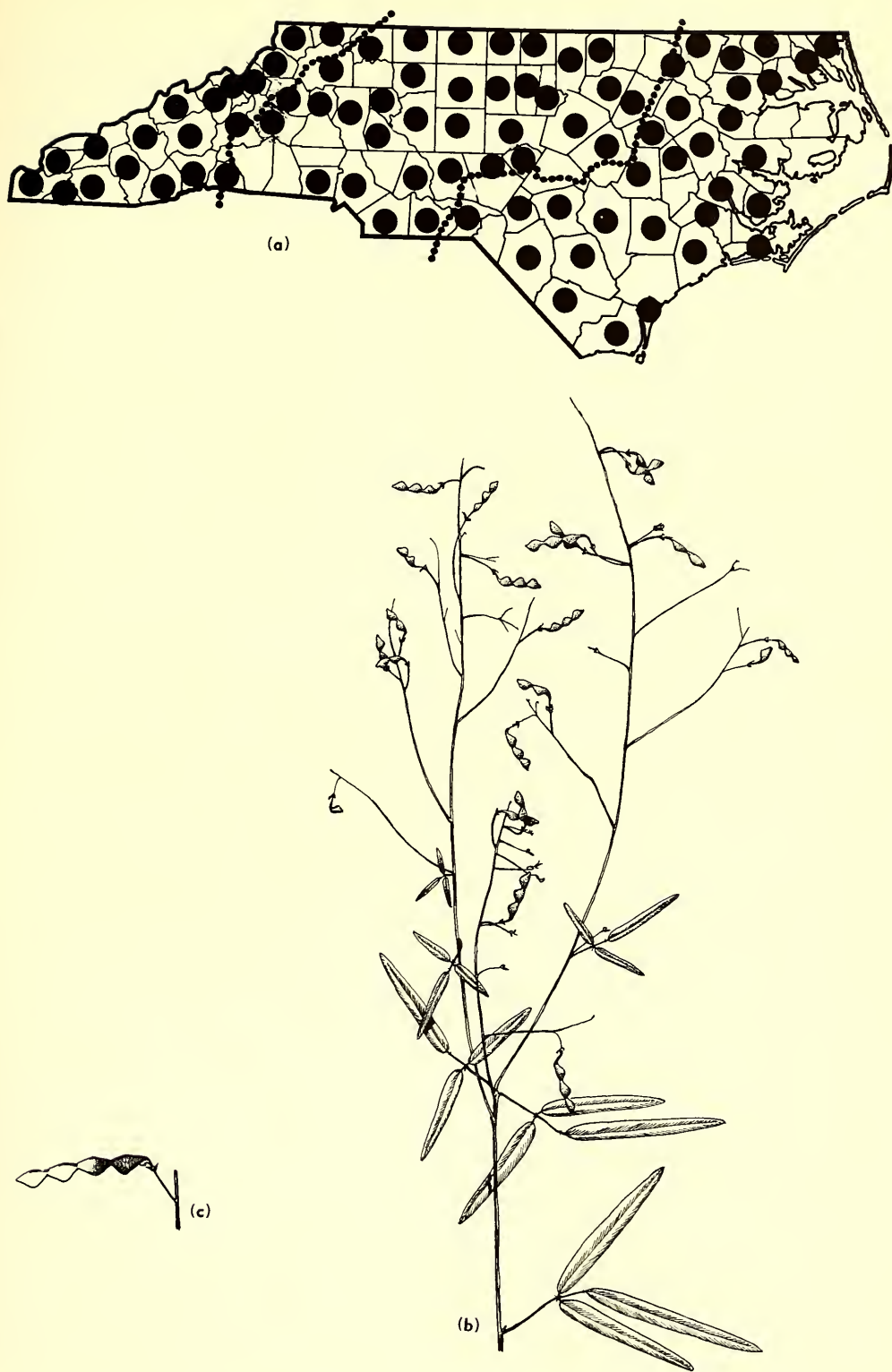


Fig. 80. *Desmodium paniculatum*. (a) Distribution; (b) Habit sketch; (c) Fruit.

ovate to ovate-lanceolate, acute to acuminate, puberulent, caducous bract about 2.5-3.5 mm long. Calyx-tube broadly campanulate, about 1.2-1.8 mm long and almost equaling all but the longest calyx-lobe which exceeds it; the calyx densely but minutely appressed to spreading puberulent throughout. Corolla pink or roseate to purple, about 8-10 mm long. Stamens diadelphous. Stipe of the fruit about 4.5-6.5 mm long and greatly exceeding the calyx-tube and equaling or more typically exceeding in length both the calyx-lobes but exceeded by the remnants of the filaments. Loment-segments 2-5 in number and each about 5-8(10) mm long and 3.5-4(5) mm wide, semi-rhomboidal in shape, with the upper suture straight or slightly convex and the lower suture more or less abruptly angled, the sides densely uncinulate-puberulent while the sutures are usually only sparsely so or glabrate.

DISTRIBUTION: A widespread species of sandy clearings or open woods from southern New York to Missouri and south to Florida and eastern Texas.

20. *DESMODIUM FERNALDII* Schub.,
Rhodora 52:147. 1950.

Meibomia rhombifolia in part of Small and other authors but not of Elliott, the author of the basionym.

Perennial herb with erect, often stout, terete and finely striate to slightly angled, simple or occasionally branched stems 0.4-1(1.3) m high, sparsely to densely uncinulate-puberulent but often becoming glabrate below. Stipules lance-attenuate or broadly triangular and acute, striate, finely puberulent, caducous, about 2-4 mm long. Petioles striate, broadly grooved above, sparsely to moderately uncinulate-puberulent, about 0.7-1.5(2.5) cm long. Leaves pinnately 3-foliolate with the rachis-stalk of the terminal leaflet grooved above, striate, sparsely to densely uncinulate-puberulent, mostly about 0.8-1.5 cm long. Leaflets ovate, rhombic-ovate, elliptic or ovate-elliptic and rounded to obtuse or even acute at the often mucronulate apex while truncate, rounded or cuneate at base; about (3)4-8(9.3) cm long and 1.8-4(5) cm wide, the lateral leaflets quite similar to the terminal but smaller; upper surface glabrous or very sparsely short-pubescent or uncinulate-puberulent, nearly glabrous below except for the inconspicuous uncinulate-puberulence along the principal veins, usually noticeably reticulate; petiolules sparsely to densely uncinulate-puberulent, about 2-4 mm long; stipels narrowly linear to short-setaceous, minutely

puberulent, about 1-2.5 mm long. Inflorescence usually a much-branched, terminal panicle about (1)2-4(6) dm long with densely uncinulate-puberulent axis and branches. Pedicels short, mostly 3-8(10) mm long, usually densely but minutely puberulent and also sparsely to moderately uncinulate-puberulent, subtended by a narrowly linear, puberulent, caducous bractlet (= secondary bract) about 0.5-0.8 mm long and the few-flowered clusters in turn subtended by a larger, ovate, puberulent, caducous bract (= primary bract) about 1.5-2.2 mm long. Calyx-tube broadly campanulate, about 1.2-2 mm long and usually equaling or exceeding the shorter calyx-lobes but exceeded by the longest, the calyx minutely puberulent throughout and short-pubescent above and on the lobes. Corolla purplish, about 8-10 mm long. Stamens diadelphous. Stipe of the fruit about 2.5-4 mm long and conspicuously exceeding the calyx-tube and usually the lobes but exceeded by the remnants of the filaments. Loment-segments (1)2-4(5) in number and each about 5.5-8 mm long and 3.5-5 mm wide, deltoid to semi-rhombic, with the upper suture straight to slightly angled and the lower broadly bowed, moderately to densely uncinulate-puberulent on both the sutures and sides.

DISTRIBUTION: A species of sandy openings and piney woods from southeastern Virginia south to Florida and west into eastern Texas.

21. *DESMODIUM GLABELLUM* (Michx.)
DC., Prodr. 2:329. 1825.

D. Dillenii Darl., Fl. Cest. ed. 2. 414. 1837 in part.

D. paniculatum var. *Dillenii* (Darl.) Isely, Am. Midl. Nat. 49: 927. 1953 in part.

Meibomia Dillenii (Darl.) Kuntze, Rev. Gen. 1:195. 1891, in part in the usage of Small and others.

Perennial herb with one or occasionally several, slender to stout, finely lined to striate, terete to strongly angulate (especially so above), erect (at least above), often much-branched stems about 0.5-1.2(1.5) m high and usually densely uncinulate-puberulent and also often very sparsely pilose, and usually inconspicuously uncinulate-puberulent on the median and upper portion of the stem below the inflorescence and usually becoming glabrate below. Stipules triangular-dentate to lance-attenuate, usually minutely pubescent and often slightly striate, usually soon deciduous, mostly about 2-5 mm long. Petioles usually broadly and shallowly grooved above,



Fig. 81. *Desmodium laevigatum*. (a) Distribution; (b) Habit sketch; (c) Leaflet and enlarged view of lower surface; (d) Fruit.



Fig. 82. *Desmodium Fernaldii*. (a) Distribution; (b) Habit sketch; (c) Leaflet and enlarged view of lower surface; (d) Fruit.

short and often subsessile to elongate, about (0.2)0.8-3(4) cm long, very densely uncinulate-puberulent or short uncinulate-pubescent. Leaves pinnately 3-foliolate with the rachis usually grooved above, densely uncinulate-puberulent and about (0.2)0.5-1.2(2) cm long. Leaflets mostly ovate, oblong-ovate, elliptic or rhombic, about (2)3-6(8) cm long and (1)2-4(5) cm wide and the apex acute to obtuse and often emarginate. Terminal leaflets of the principal cauline leaves almost always less than 3-times as long as wide and mostly between 1.5-2.5-times as long as wide; lateral leaflets smaller but more or less similar to the terminal; both surfaces usually pubescent but the upper usually less so than the lower or occasionally even glabrate, the pubescence usually moderately and closely appressed to strongly spreading and short-pubescent; petioles sparsely to densely short-pubescent, about 1.5-3 mm long; stipels setaceous, persistent, mostly 1-2(2.5) mm long. Inflorescence usually a terminal, much-branched, loose panicle mostly (1)2-4 dm long (less commonly axillary or racemose) with the axis and branches usually densely uncinulate-puberulent or uncinulate-short-pubescent and occasionally with a sparse intermixture of pilose trichomes. Pedicels short, (2)4-8(12) mm long and densely uncinulate-puberulent, subtended by a very narrowly linear, pubescent, caducous bractlet (= secondary bract) about 0.5-1.2 mm long and the 1- to few-flowered clusters subtended by an ovate-lanceolate, striate, pubescent, caducous primary bract about 1.8-2.5 mm long. Calyx-tube broadly campanulate, about 1-1.2 mm long and usually slightly exceeding or equaling the four shorter calyx-lobes but exceeded by the longest which is often about 2 mm long, usually minutely short-pubescent and above and on the lobes usually short-pilose. Corolla purplish, about 6-9 mm long. Stamens diadelphous. Stipe of the fruit usually 3-5 mm long (or reportedly up to 7 mm long) and somewhat exceeding the calyx and even the remnants of the filaments. Loment-segments (1)2-4(5) in number and each about 4-8(12) mm long and 3.5-5 mm wide and usually broadly rhombic to triangular in outline but occasionally less angular and then semi-obovate, with the upper suture slightly outwardly bowed and abruptly angled or straight or occasionally slightly convexly curved and with the lower suture strongly angled or more rarely somewhat rounded, densely uncinulate-puberulent on both sides and sutures.

DISTRIBUTION: A widespread species ranging from Massachusetts and Michi-

gan south at least into South Carolina and eastern Texas.

The treatment proposed here for those plants described under the names *D. paniculatum*, *D. glabellum* and *D. perplexum* is at the very best tentative. Dr. Bernice Schubert's long-awaited monograph gives every promise of doing much to clarify the puzzling range of variation exhibited within this complex. Isely in two recent publications (1953 and 1955) has concluded that these plants which Schubert (1950) and in Gray's Manual treats as three species in reality belong but to one and that those who distinguish more are merely indicating extremes. Isely did accept two varieties, which he clearly indicated were "form varieties" and not geographical varieties, for apparently the three taxa as circumscribed here as species. Gleason (1952) recognized two species within this complex but stated that belonging to each of those species were plants which were indistinguishable from representatives of the other species.

From the material at hand there appears to be but little difficulty in separating the narrow leaflets and glabrous or sparingly to moderately appressed-pubescent plants. These are certainly as distinct as many if not most of the species presently recognized as species in *Lespedeza* and in *Desmodium* itself. Those specimens with broader leaflets and almost always much more pubescent are quite satisfactorily separated into two piles but not by using most of the characters indicated by Schubert (i.e. leaflet thickness, petiole length, reticulation, shape of apex of leaflet etc.). Those specimens belonging to her *D. perplexum* are invested with a moderately to dense spreading pilosity while those belonging to *D. glabellum* are very densely uncinulate-puberulent and only rarely very sparingly pilose below the inflorescence. I am dubious in accepting this as sufficient evidence of specific status. Additional study is obviously required but until then I feel it safest to follow the most recent monographer of the genus whose treatment does seem at present the more convincing.



Fig. 83. *Desmodium glabellum*. (a) Distribution; (b) Habit sketch; (c) Enlarged section of stem; (d) Fruit.

22. *DESMODIUM PERPLEXUM* Schub.,
Rhodora 52:154. 1950.

D. Dillenii Darl., Fl. Cest. Ed. 2. 414. 1837,
in part.

D. paniculatum var. *Dillenii* (Darl.) Isely,
Am. Midl. Nat. 49: 927. 1953, in part.

Meibomia Dillenii (Darl.) Kuntze, Rev.
Gen. 1:195. 1891, in part in the usage
of Small and others.

Perennial herb with 1 or occasionally several, slender to stout, finely lined to striate, terete to strongly angulate (especially so above) erect stems mostly 0.5-1.2 (1.5) m high that are above usually much-branched and both densely uncinulate-puberulent and moderately to copiously supplied with wide-spreading to somewhat ascendent, pilose trichomes. Stipules lance-attenuate, striate, usually short-pubescent and varying from soon deciduous to long-persistent, about 2-6 mm long. Petioles grooved above, short to elongate, mostly about (1) 2.5-5 (7.5) cm long, usually sparsely uncinulate-puberulent and always densely spreading-pilose. Leaves pinnately 3-foliate with the rachis grooved above and sparsely or more commonly densely spreading pilose and mostly about 0.5-1.5 (2.2) cm long. Leaflets mostly elliptic-ovate to ovate, mostly about (2) 3-7 (10) cm long and 2-4 (6) cm wide and with the apex usually acute but often obtuse. Terminal leaflets between 1.5-2.5-times as long as wide. Lateral leaflets smaller but more or less similar; both surfaces usually pubescent but the upper usually more sparsely pubescent to occasionally even glabrate, the pubescence moderately appressed to more typically strongly spreading and short-pubescent to more characteristically pilose; petiolules usually short-pilose and about 1.5-3 mm long; stipels setaceous, persistent, mostly 1-2 (2.5) mm long. Inflorescence usually a terminal, much-branched, loose panicle mostly (1) 2-4 dm long (less commonly axillary or racemose) with the axis and branches usually very densely uncinulate-puberulent and with a sparse to moderate intermixture of pilose trichomes. Pedicels mostly (2) 4-8 (10) mm long, densely uncinulate-puberulent, subtended by a very narrowly linear, pubescent, caducous bractlet (= secondary bract) 0.5-1.2 mm long and the 1- to few-flowered clusters subtended by an ovate-lanceolate, striate, short-pubescent, caducous, primary bract about 1.8-2.5 mm long. Calyx-tube about 1-1.2 mm long, usually slightly exceeding or at least equaling the four shorter calyx-lobes but exceeded by the longest which is up to 2 mm long, usually minutely short-pubescent overall while above and on the lobes often short-pilose. Corolla purplish, about 6-9 mm long.

Stamens diadelphous. Stipe of the fruit mostly 3-5 mm long. Loment-segments (1) 2-4 (5) in number and each about 4-8 (12) mm long and 3.5-5 mm wide, usually broadly rhombic to triangular in outline, densely uncinulate-puberulent on both sides and sutures.

DISTRIBUTION: A widespread species ranging from southern Quebec into Iowa and south to at least South Carolina and probably Texas.

As is discussed more fully under the preceding species, the distinctions between *D. glabellum* and *D. perplexum* as well as *D. paniculatum* have been the source of considerable variation in treatment by recent taxonomists. The treatment presented here seems far from satisfactory. It is derived in the main from that of Schubert who it is hoped will soon be able to publish her long-awaited monograph of this difficult group. In the matter of nomenclature I am also following her conclusion that *D. Dillenii* Darl. be considered as a *nomen confusum* although an argument might be developed that Darlington's name ought to be taken up in the place of *D. perplexum*. However, these are all questions that might best be postponed until Schubert's treatment is published.

26. *LESPEDEZA* Michx., Fl. Bor. Am. 2:
70. 1803.

Erect, decumbent or procumbent, annual (as in 2 of our introduced species) or perennial herbs or shrubs (some exotic or introduced species) with persistent or long-persisting, setaceous, subulate, linear or ovate-lanceolate stipules. Leaves pinnately 3-foliate with short- to long-petiolate, estipellate, pinnately veined, equilateral leaflets. Flowers very rarely solitary, usually borne in few- to many-flowered, loosely arranged to compact, sessile or subsessile to long-pedunculate, axillary or terminal, spicate, racemose, capitate or more rarely paniculate clusters with the usually short pedicels subtended by a usually linear, small bract and with a pair of minute, inconspicuous bractlets immediately beneath the calyx. Both apetalous (= cleistogamous) and petaliferous flowers borne in most species but the apetalous more readily detected and more abundant in some species than in others; the calyces and fruit of the cleistogamous flowers usually of a different shape and readily distinguishable from those produced by the petaliferous flowers. Calyx-tube of petaliferous flowers companulate to cylindrical; the

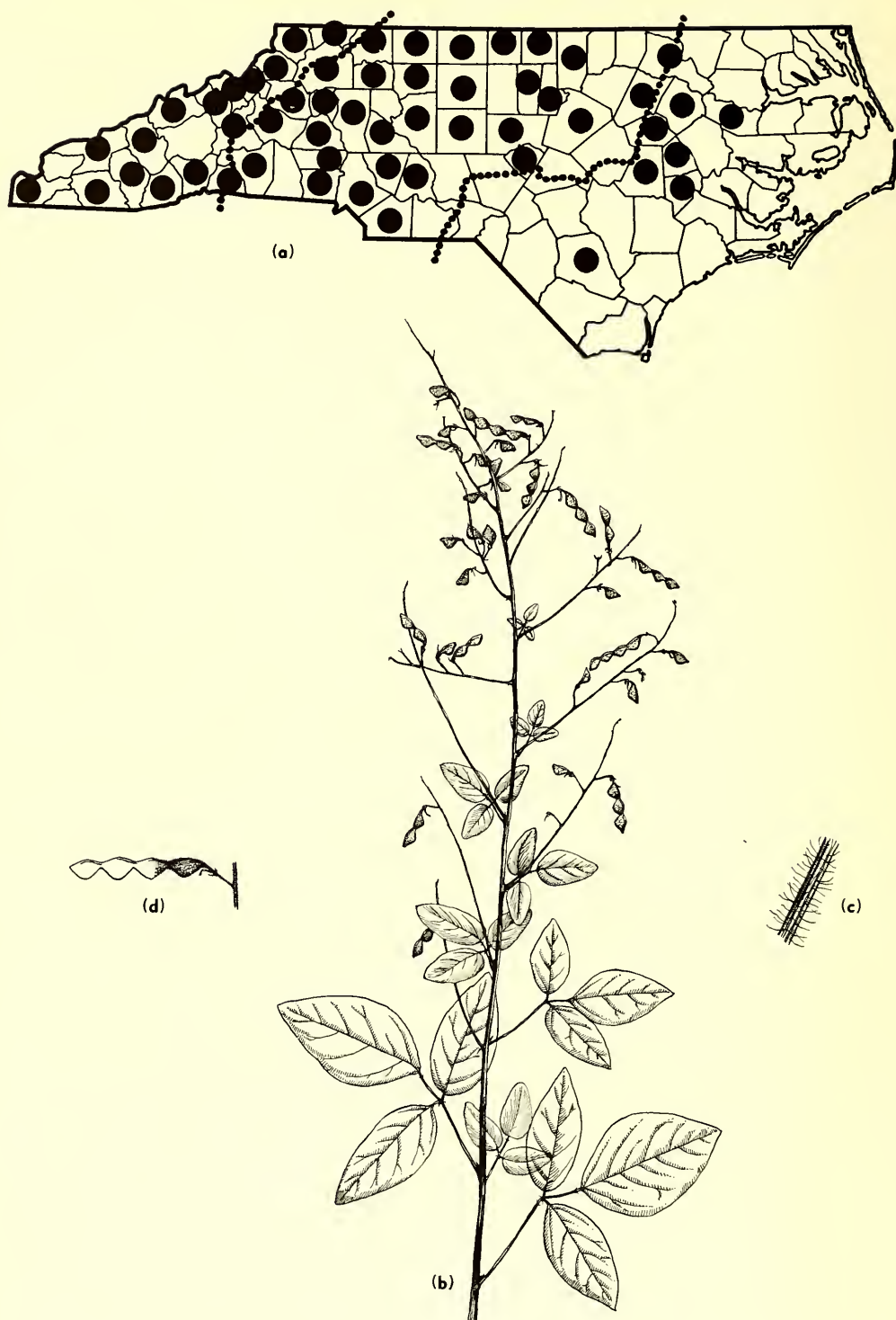


Fig. 84. *Desmodium perplexum*. (a) Distribution; (b) Habit sketch; (c) Enlarged section of stem; (d) Fruit.

5 short to elongate, linear or subulate calyx-lobes of almost equal length, persistent in fruit. Corolla papilionaceous, violet, purplish, roseate, yellowish or whitish; the standard oblong to obovate or even suborbicular, clawed; the wings oblong and slightly curved, clawed, free or slightly adherent to the incurved, obovate keel petals. Stamens equal and diadelphous (9 + 1). Ovary sessile to noticeably stalked. Legume elliptic, oval or orbicular, sessile to short-stalked (formed from the basal abortive joint of loment), flattened, often reticulate, 1-seeded, indehiscent.

A genus of perhaps 90 species (estimates range from 33 to more than 120) native to eastern North America, Asia and Australia. (Named in memory of the Spanish governor of East Florida, Vincente Manuel de Céspedes, during the late 18th century at the time of Michaux's travels in that region. The name of the governor was rendered Lespedez in Michaux's Flora.)

A genus of considerable complexity within the eastern portion of North America where perhaps twelve to fifteen species are native in addition to several Asiatic species which have either become naturalized or are planted and occasionally escape. Hybridization is suspected of being relatively frequent by some students of the group which would help to explain at least some of the difficulty encountered in attempting to identify members of this genus. The American species of BUSH-CLOVER seem to form 3 or perhaps 4 groups of very closely related species many of which possess within themselves a perplexing array of infraspecific variation. Within the species-group the differences are small and of a type and of such magnitude that they indicate unusually close relationship between the species. Fernald (1950) lists a wide range of crosses as having occurred between various species even between species belonging to the most widely differing species groups. Fernald has suggested that our species are in need of a critical reappraisal and with that opinion one could scarcely disagree. The present treatment is not satisfactory but is perhaps as good as can be done until a detailed study of the American species is prepared. At present only a general picture can be presented for this perplexing group.

1. Perennials with narrowly linear, subulate to setaceous stipules and bracts; calyx-lobes usually slender and acute.
2. Petals purple or purplish; calyx-lobes even of the petaliferous flowers conspicuously shorter than the fruit; apetalous flowers often numerous and readily detected.
3. Plants with trailing or procumbent, vine-like stems.
4. Stems and petioles downy with wide-spreading or weakly ascending short pubescence 1. *L. procumbens*.
4. Stems and petioles sparsely to densely upwardly appressed-puberulent and often appearing glabrate 2. *L. repens*.
3. Plants with erect or strongly ascendent stems.
5. Shrubs mostly 1-3 m high and often with loosely-arranged elongate racemes forming showy, large (often 4 dm or more) terminal, paniculate clusters 3. *L. bicolor*.
5. Herbs mostly less than 1.2 m high and with axillary racemes short-pedunculate or at least not greatly exceeding the length of the subtending leaf.
6. Pubescence of the upper stem usually noticeably spreading-pilose, at least some of the medial, axillary racemes over-topping their subtending leaves 4. *L. Nuttallii*.
6. Pubescence of the upper stem inconspicuous and stems often appearing glabrate, appressed short-pubescent, strigillose or spreading short-pubescent; the medial axillary racemes overtopped by their subtending leaves.
7. Leaflets usually broadly oblong to oblong-elliptic or elliptic (less commonly ovate, obovate, or sub-orbicular).
8. Stems and leaves usually densely velvety-pubescent with short-spreading hairs; fruit usually densely, spreading or ascendent, short-pilose or short-pubescent .. 5. *L. Stuevei*.
8. Stems and leaves usually sparsely to densely strigillose or appressed short-pubescent; fruit sparsely to densely strigillose 6. *L. intermedia*.
7. Leaflets mostly linear to very narrowly oblong 7. *L. virginica*.
2. Petals yellowish or yellowish-white (the standard often with a purplish spot); calyx-lobes of the petaliferous flowers usually almost equaling to conspicuously ex-

ceeding the length of the fruit; cleistagamous flowers few, inconspicuous and intermixed with the petaliferous.

9. Flowers solitary or in 2-4-flowered clusters on very short peduncles and appearing sessile or subsessile and much exceeded by the subtending leaves; leaflets narrowly cuneate; calyx-lobes less than 3.5 mm long 6. *L. cuneata*.
9. Flowers borne in many-flowered clusters on often elongate peduncles and the inflorescence usually about equaling or greatly exceeding the subtending leaf; leaflets usually broadest near the base or middle and not at the apex or, if broadest near the apex, then less than 3-times as long as broad; calyx-lobes exceeding 3.5 mm long.
10. Leaflets usually less than twice as long as wide, mostly broadly oblong to oblong-orbicular or oval, suborbicular, broadly obovate or even broadly-elliptic 9. *L. hirta*.
10. Leaflets usually 2-times or more as long as wide, mostly oblong to narrowly elliptic or even linear.
11. Calyx usually 7-12 mm long and usually conspicuously exceeding the fruit in length; the leaflets mostly 4-times or less as long as wide 10. *L. capitata*.
11. Calyx usually about 5-7 mm long and about equaling the fruit in length or but little exceeding it; leaflets mostly 4-10-times or more as long as wide 11. *L. angustifolia*.
1. Annuals with ovate to ovate-lanceolate stipules and bracts; calyx lobes usually broad and somewhat blunt.
12. Stems upwardly appressed-pubescent; petioles of the principal leaves mostly 4-10 mm long; leaflets of the younger or upper leaves conspicuously ciliate 12. *L. stipulacea*.
12. Stems downwardly appressed-pubescent; petioles of the principal leaves usually less than 3 mm long; leaflets of the younger or upper leaves not conspicuously ciliate (the marginal trichomes appressed and usually much shorter than in species # 12) 13. *L. striata*.

L. violacea (L.) Pers. is indirectly attributed to the North Carolina flora as it is reportedly wide-spread to much of eastern United States. I have not encountered specimens of this species that I recognized. It is in spite of its supposed wide range

comparatively little collected. It is apparently rare and not clearly understood judging by the heterogeneity of the plants passing under this name in most herbaria.

It apparently possesses the following features:

L. violacea (L.) Pers. Erect or ascending perennial herb with strigillose to glabrate stems. Leaflets elliptic. Racemes loosely flowered and much exceeding the subtending leaves. Wings distinctly shorter than the keel-petals.

In the above key it would key out to *L. intermedia* and the above brief characterization would distinguish it for that commonly encountered species.

1. LESPEDEZA PROCUMBENS Michx., Fl. Bor. Am. 2: 70. 1803.

Perennial herb with several to numerous procumbent to decumbent stems occasionally forming prostrate mats mostly 3-9 (12) dm long and about 1-2 mm in diameter and more or less densely covered with soft, wide-spreading or weakly ascending short-pubescent. Stipules subulate-setaceous, mostly 1.5-4 mm long, sparsely puberulent, long persisting. Petioles slender, densely short-pubescent, mostly (1)3-10(15) mm long and typically shorter than or just equaling the width of the leaflets. Leaflets ovate, oblong to elliptic, usually not more than twice as long as wide, mostly (0.4)0.8-1(2.5) cm long and (0.3)0.5-1.0(1.8) cm wide, broadly rounded to retuse at the short-apiculate apex, broadly rounded at base, sparsely to densely spreading, downy short-pubescent on both surfaces and very shortly petiolulate. Flowers borne in axillary racemes on filiform, upwardly appressed-puberulent peduncles about 3-8 cm long and hence much exceeding the subtending leaves (mostly by 2-4-times its length) and with usually (2)4-6(10) flowers borne at its summit on slender, short, appressed puberulent pedicels about 1-2 mm long (or the flowers sometimes all apetalous and nearly sessile in the leaf axils). Calyx usually densely upwardly appressed puberulent and closely subtended by 2 inconspicuous, linear-lanceolate, closely appressed bractlets about 1 mm long; the tube turbinate, about 1.2-2.5 mm long; the lobes lance-linear, unequal in size, the upper two united for more than half their length and hence appearing to be deeply bifid, the other lobes about 1.5-2 mm long. Petals purplish to roseate, about 5.5-8 mm long, the keel about equaling the wing petals in length but both slightly exceeded by the

standard. Legume mostly 4-6 mm long, much-exceeding the calyx in length, suborbicular to elliptic, apiculate, strongly reticulate and usually spreading short-puberulent.

DISTRIBUTION: A native species found in sandy or clayey upland woods or clearings and along roadsides and waste places from Florida to Texas and north to southern Vermont and New Hampshire and southeastern Kansas.

The differences that distinguish this species from *L. repens* are neither striking nor do they seem very fundamental. They are primarily differentiated by the spreading downy pubescence of *L. procumbens* which is often rather closely associated with the leaflets being less than twice as long as wide while the pubescence of *L. repens* is closely appressed-puberulent and the leaflets are typically twice as long as wide or even longer. Maximowicz in his revision of the genus united the two taxa under the name *L. repens* (Acta Hort Petrop. 2: 327-388. 1873). Fernald (1950) suggests that *L. procumbens* might better be considered as a variety of *L. repens* with which it reputedly hybridizes. Fernald however maintained the two as separate species. Isely (1955) felt that the differences between the two species, although perhaps not major, were as fundamental as those which distinguish most American lespedezas and furthermore he suggested that the relationship of *L. procumbens* was with *L. Nuttallii* while the affinities of *L. repens* were with *L. violacea*.

No specimens matching the description of var. *elliptica* Blake were recognized in the North Carolina material. This variety has been described as having narrowly elliptic-oblong leaflets about 4-times as long as wide. Its range is reported by Fernald (1950) as being "Ala. to Mo., n. to e. Mass. and Ind."

2. LESPEDEZA REPENS (L.) Bart., Prodr. Fl. Phil. 2: 77. 1818.

Perennial herb with several to numerous, procumbent to decumbent stems occasionally forming prostrate mats mostly 3-8 dm long or occasionally longer, about 1-1.5 mm in diameter, and sparsely to densely upwardly appressed-puberulent. Stipules subulate-seta-

ceous, mostly 1.5-4.5 mm long, sparsely puberulent, long-persistent. Petioles slender, sparingly to densely upwardly appressed-puberulent, about (1.5)3-8(12) mm long, usually about as long as the width of the leaflets or even shorter and almost always shorter than the length of the leaflets. Leaflets elliptic, obovate-oblong or rarely even oval or oblong, commonly about twice as long as wide, about (0.4)0.8-1.5(2.5) cm long, obtuse to broadly rounded at the apiculate apex and usually not retuse, obtuse or narrowing to an acute base, glabrate or more commonly sparingly or even densely appressed-puberulent on both surfaces and with very short petiolules. Flowers of the petaliferous type borne in axillary racemes on elongate, filiform, sparsely to densely but inconspicuously upwardly appressed-puberulent peduncles mostly (2)4-8(9) cm long and hence usually exceeding the subtending leaves by 2-4-times with (2)4-6(8) loosely arranged flowers borne near the summit on slender, appressed-puberulent pedicels mostly 1-2.5 mm long or the flowers sometimes all apetalous and then nearly sessile. Calyx usually upwardly appressed puberulent and closely subtended by 2 inconspicuous, linear, closely appressed bractlets about 0.8-1.5 mm long; the tube turbinate, about 1.4-2.2 mm long; the lobes lance-linear, inconspicuously unequal, the upper two more than half united and hence appearing to be but deeply bifid, the other lobes mostly 1.5-2 mm long. Petals violet to purplish, mostly 6-8 mm long and about of the same length or the keel slightly exceeding the wing petals and the standard. Legume mostly 3-5 mm long, much exceeding the calyx in length, broadly oval to suborbicular, apiculate, reticulate and appressed puberulent.

DISTRIBUTION: A native species found in dry upland woods and clearing or along roadsides and other waste places from Florida into Texas and north to southern Connecticut and New York and Wisconsin.

As is discussed under the preceding species, *L. repens* is not separable from *L. procumbens* by what appear to be strong or fundamental characters and has been considered by some to be no more than a minor variation. Further study of this complex is obviously needed and of course should be based upon material from the entire range of the species. It would almost seem that the primary reason that the two have been maintained as distinct species by most authors is the ease with which they may be separated by their striking difference in pubescence.

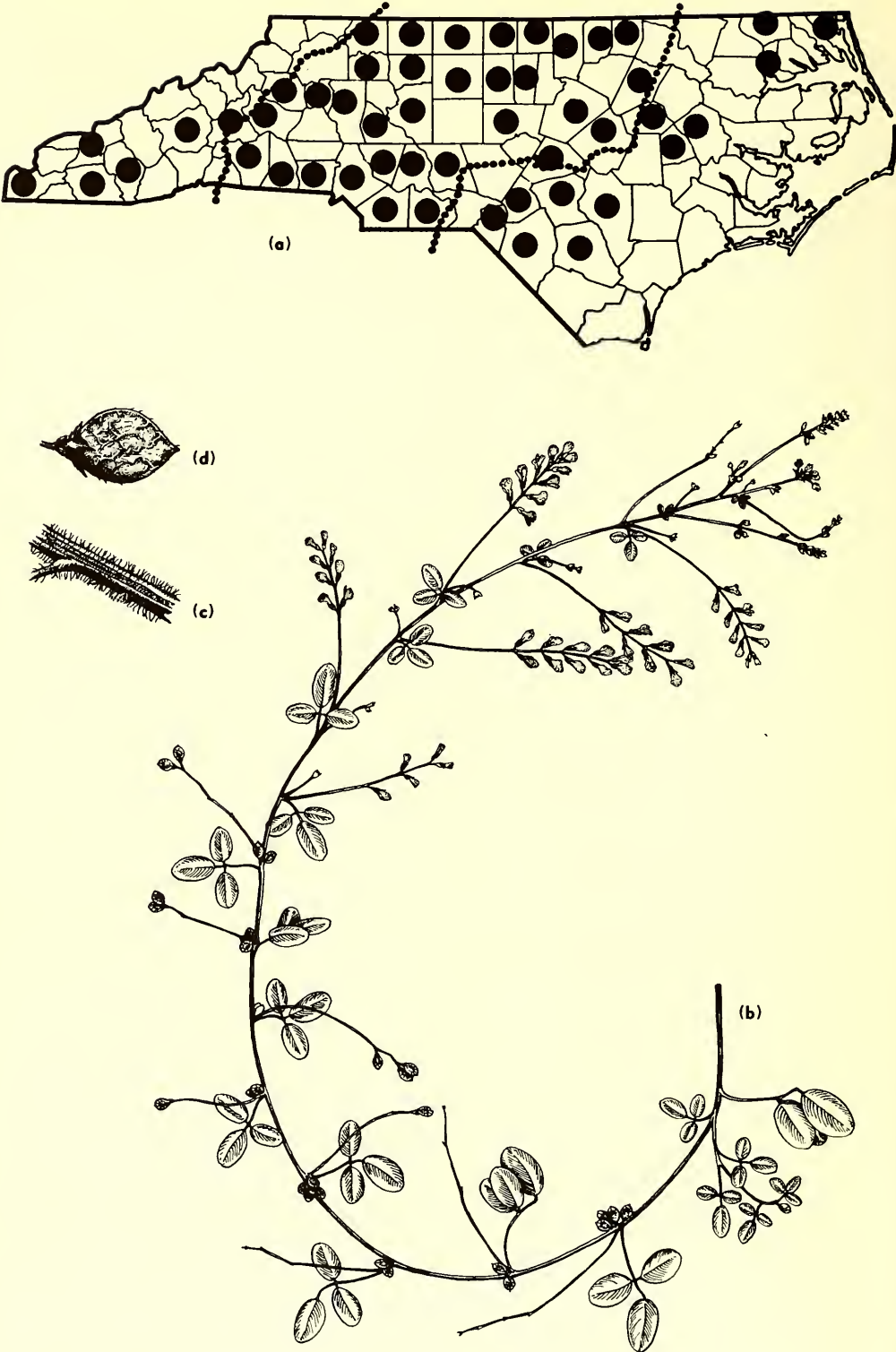


Fig. 85. *Lespedeza procumbens*. (a) Distribution; (b) Habit sketch; (c) Enlarged section of stem; (d) Fruit.

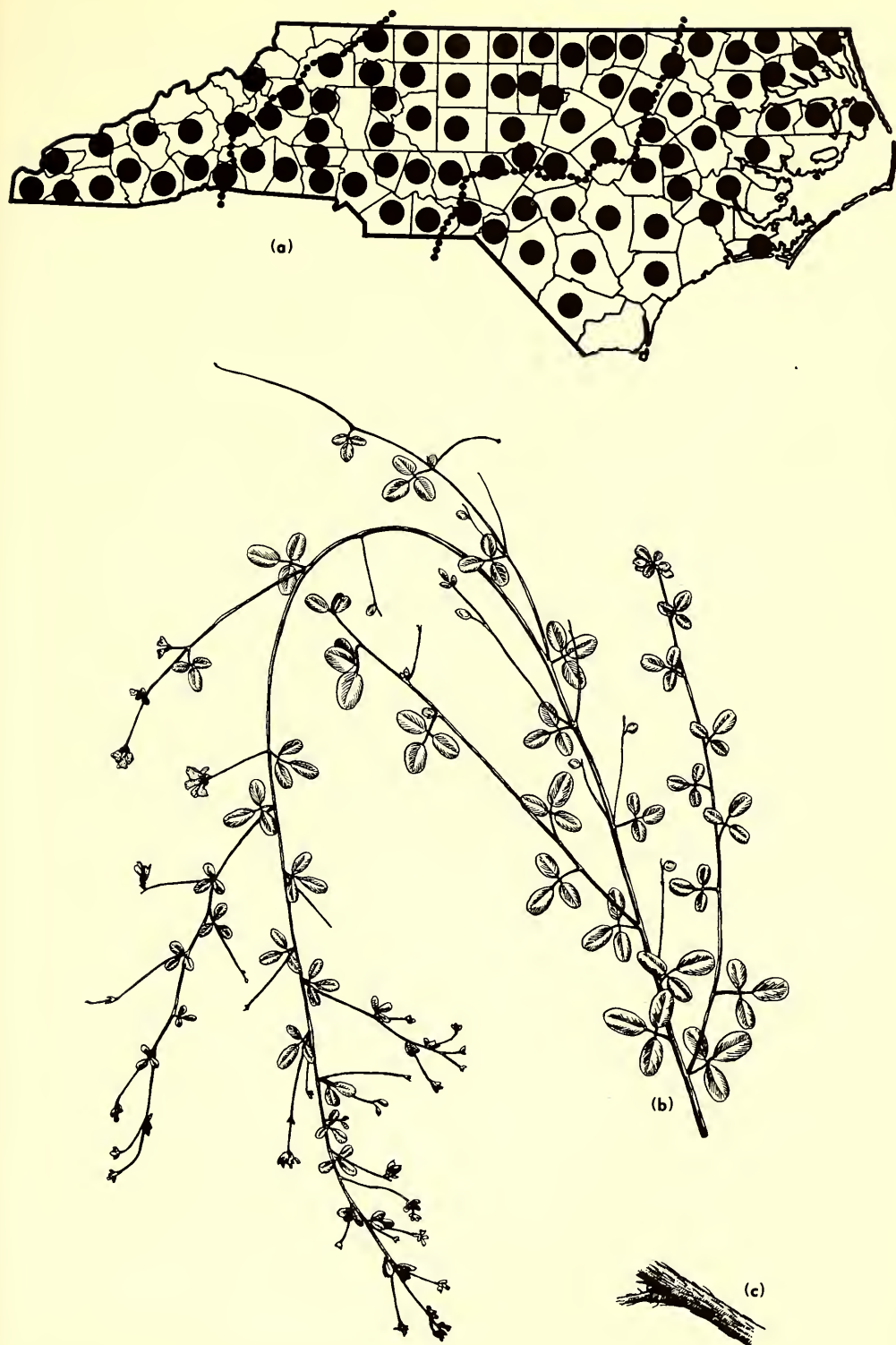


Fig. 86. *Lespedeza repens*. (a) Distribution; (b) Habit sketch; (c) Enlarged section of stem.

3. *LESPEDeza BICOLOR* Turcz., Bull. Soc. Nat. Moscou 13: 69. 1840.

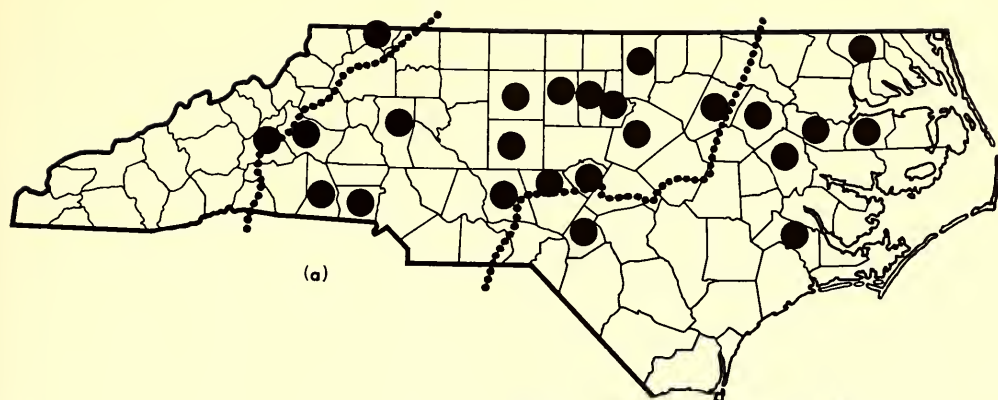
Bushy shrub 1.0-3 m high with terete but strongly ridged and grooved stems mostly 0.5-1.5 cm in diameter (or occasionally 3 cm or more near base) densely strigillose or appressed short-pubescent above but sparingly so or glabrate below. Stipules narrowly linear, striate, long-persistent, ascendent or weakly spreading, densely but minutely strigillose, mostly (0.3)0.5-0.8(1.2) mm long. Petioles slender, often elongate, about (0.8)2-6(8) cm long, the median and lower usually equaling or exceeding the length of the leaflets, sparsely to densely strigillose. Leaflets usually elliptic or ovate, or less commonly suborbicular to obovate and about (1)2-5(7.5) cm long and (0.8)1-2(3.5) cm wide, generally obtuse to broadly rounded at the apiculate (but occasional retuse) apex and obtuse to rounded at base, usually both surfaces appressed-pubescent or strigillose but the upper occasionally sparingly so to glabrate. Petiolules very densely appressed short-pubescent, those of the smaller upper leaflets about 1 mm long, those of the median and lower leaflets about 2-4 mm long; the terminal leaflets of the medial and lower leaves appearing extremely long-stalked due to the appressed short-pubescent to glabrate rachis of about 1-2 cm long, the rachis of the upper leaflets very short and scarcely discernible. Flowers borne in numerous, loosely arranged racemes in the axils of the reduced upper leaves or forming large, conspicuous, terminal panicle clusters of numerous individual racemes about 1-4 cm long with appressed-pubescent peduncles about 1-5 cm long with the individual flowers on ascending to loosely spreading, minutely strigillose pedicels of about 1.5-5 mm long subtended by ovate, reddish-brown, finely strigillose bracts about 0.5-1.5 mm long and with a pair of closely appressed, similar bractlets about 1-1.2 mm long just beneath the flower. Calyx densely to sparingly strigillose and with inconspicuous almost unelevated venation; calyx-tube cylindrical, about 1.5-2.5 mm long; the lobes about 2.5-4.5 mm long, linear-lanceolate, acute, the lowermost the longest by about 1 mm; the calyx about 5-6.5 mm long and greatly exceeded by the corolla. Petals rosey-purple and about 1-1.2 cm long. Legume broadly elliptic, tapering to both ends and with a slender stipitate base about 2 mm long and with an often persistent style up to 1 cm long, densely upwardly appressed-pubescent, about 6-8 mm and conspicuously exceeding the calyx by 3-5 mm.

DISTRIBUTION: A species native of Japan which has been introduced into the

Southeastern States where it has become established to a limited degree.

4. *LESPEDeza NUTTALLII* Darl., Fl. Cest. ed. 2: 420. 1837.

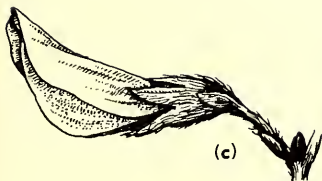
Perennial herb with one to few, archingly ascendent to erect, terete, finely ridged and grooved stems usually unbranched below but above often much-branched, about (0.4)0.6-1(1.2) m high and near the base about (2)3-5(7) mm in diameter and below the inflorescences usually densely or occasionally sparsely softly spreading-pilose and above densely spreading short-pubescent. Stipules narrowly linear to linear-subulate, long-persistent, striate, ascendent or closely appressed to the petiole to spreading or even recurved, densely appressed short-pubescent or intermixed with a few spreading pilose trichomes, about (2.5)3-5(6) mm long. Petioles of the median and lower leaves often slender and elongate and almost equaling to rarely even exceeding the leaflets in length, mostly 1.5-3(4) cm long and densely to sparsely spreading-pilose; those of the upper leaves short and often exceeded in length by the width of the leaflets, usually 0.3-0.8(1.2) cm long and densely spreading short-pubescent. Leaflets elliptic to oblong-elliptic, the medial and lower ones about 2-4 cm long and the upper leaflets about 0.8-1.5 cm long, mostly about one-third to two-thirds as wide as long, obtuse to broadly rounded (or even shallowly retuse) at the short-apiculate apex and obtuse to broadly rounded at the base with the upper surface sparingly pilose to more commonly glabrate, the lower surface usually completely but not densely spreading-pilose. The petiolules densely pubescent in a manner similar to that of the petioles (*i.e.* those of the principal leaves spreading-pilose and those of the upper leaves short-pubescent); those of the principal leaflets about 1.5-2 mm long but the terminal appearing much longer due to the rachis-stalk of about 0.5-1 cm long; those of the small upper leaves about 0.7-1.2 mm long and almost indistinguishable from the 1-2 cm rachis of the terminal leaflet. Flowers borne in numerous, compact to loosely arranged, cylindrical to nearly globose, spicate racemes of about 1-2(3) cm long borne on slender, short to elongate peduncles arising from the axils of the upper leaves or apparently terminating the lateral and main stem; often the ascendent peduncles, nearly equaling to even exceeding in length the subtending leaves, mostly 1-2 cm long and the pubescence varying from pilose to puberulent; the individual flowers ranging from widely divergent to strongly ascendent and from few and loosely



(a)



(b)



(c)

Fig. 87. *Lespedeza bicolor*. (a) Distribution; (b) Habit sketch; (c) Flower.

clustered to many and imbricate; the pedicels inconspicuous, ranging from about 0.5-2(3) mm long, usually very short-pubescent, each subtended by a narrowly ovate to linear, closely appressed, reddish-brown, strigillose bract about 0.8-2 mm long and with a pair of similar narrowly-linear bractlets of about 1.5-2.2 mm long just beneath the flower. Calyx densely upwardly-appressed pubescent or strigillose and with the venation scarcely elevated, calyx-tube about 1.4-2 mm long; the lobes linear, acute, about 2.5-4 mm long, inconspicuously unequal; the calyx about 6 mm long and exceeded by the corolla by about 2-3 mm. Petals purplish, about 8-9 mm long. Legume elliptic, tapering slightly to the base and conspicuously to the almost rostrate apex, densely spreading short-pubescent, mostly 6-8 mm long and usually slightly exceeding the calyx-lobes by 1-2 mm in length.

DISTRIBUTION: A native species ranging from New Hampshire south to Georgia and Alabama and west to southern Michigan, Missouri and Arkansas.

Clewell (Am. Jour. Bot. 48: 545. 1961) reports that *L. Nuttallii* is a hybrid between *L. hirta* and *L. intermedia* and that seeds from *L. Nuttallii* developed into a variable progeny segregating towards both of the presumed parents. In North Carolina *L. Nuttallii* has been most frequently collected in the mountains while *L. intermedia* and *L. hirta* are wide-spread throughout much of the state. If this theory on the origin of *L. Nuttallii* is indeed correct, it is puzzling that the presumed hybrid has not been found in the Coastal Plain where both of the presumed parental species are frequent. Wiegand and Eames (1926, p. 279) apparently first suggested the hybrid origin of *L. Nuttallii* and mentioned *L. hirta* and *L. intermedia* as the participants in the cross.

5. LESPEDeza STUEVEI Nutt., Gen. 2: 107. 1818.

Perennial herb with one to few, stiffly erect, terete, finely ridged and grooved, unbranched or branched (with the branches virgate, few to many and usually restricted to the upper half of the plant) stems usually (0.3)0.5-0.8(1.2) m high and at or near the base about (1)2-5(7) mm in diameter; densely velvety-pubescent with short, spreading hairs and occasionally becoming glabrate below.

Stipules narrowly linear-subulate to setaceous, long-persistent, venation usually inconspicuous, strongly ascendent but in age often spreading, densely appressed or spreading short-pubescent, usually 2.5-6 mm long. Petioles mostly short, generally about (0.3)0.5-1.2(2) cm long and usually very densely, spreading-pubescent and appearing velvety. Leaflets typically oblong-elliptic to oblong but less commonly ovate, obovate or even sub-orbicular, mostly (0.6)1-2(3) cm long and (0.3)0.5-1(1.2) cm wide, mostly (1.5)2-3-times as long as wide, obtuse to broadly rounded at the usually retuse but short-apiculate apex, the base obtuse to broadly rounded; the upper surface usually densely spreading pilosulose but occasionally more sparsely pubescent above and then often ascending or sometimes even somewhat appressed; the lower surface usually densely spreading pilose. Petiolules very densely spreading pilose, mostly 0.7-1(1.5) mm long, that of the terminal leaflet attached to a densely pubescent rachis of about 1-6 mm long. Leaves usually appearing crowded and closely enveloping the stem. Flowers borne in usually densely, sessile or short-pedunculate clusters in the axils of many of the medial and upper leaves which almost invariably overtop the inflorescences; the peduncles or axes of the inflorescence usually downy short-pubescent with similarly pubescent pedicels of about 0.5-3 mm long subtended by a reddish-brown, appressed to somewhat spreading, short-pubescent, linear bract of about 0.7-1.5 mm long and with a pair of similar bractlets just beneath the flower of about 1-2 mm long. Calyx densely strigillose or appressed short-pubescent and without conspicuously elevated venation; calyx-tube about (0.8)1-1.5(2) mm long; the lobes narrowly linear, acute to acuminate, about (1.2)1.5-2.8(3.5) mm long, unequal, the two uppermost united for about one-third or rarely about half their length; the calyx about 2.5-5.5 mm long and greatly exceeded by the corolla. Petals purplish, about 6-8 mm long. Legumes mostly formed from the much smaller, inconspicuous, apetalous flowers; elliptic to ovate with conspicuously elevated and reticulate venation and usually densely short-pilosulose with spreading or ascendent pubescence but occasionally short-pubescent and even more or less appressed, mostly (4)5-7 mm long.

DISTRIBUTION: A native species commonly found in dry open sites from Massachusetts to eastern Kansas and south to Florida and eastern Texas.

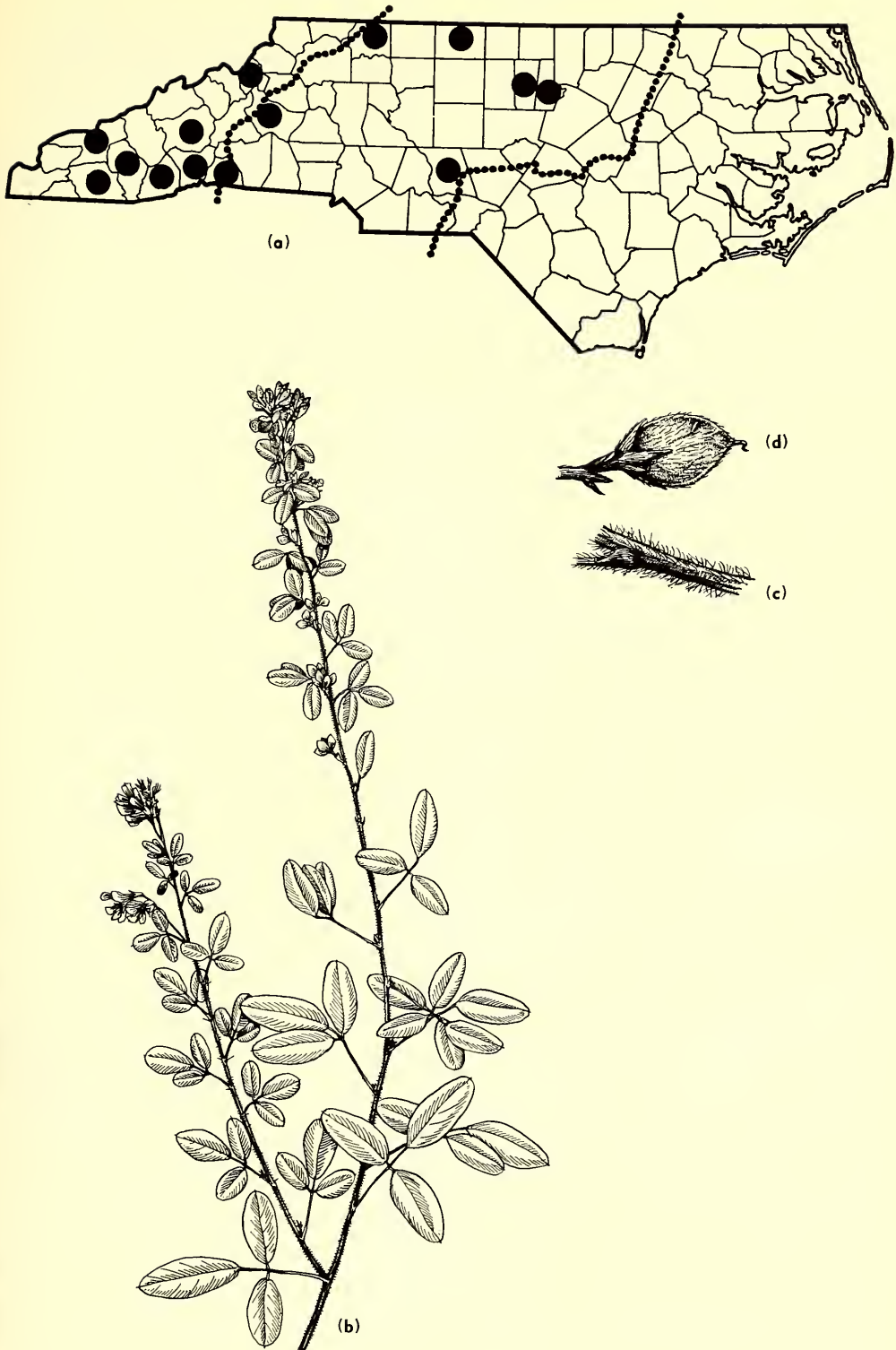


Fig. 88 *Lespedeza Nuttallii*. (a) Distribution; (b) Habit sketch; (c) Enlarged section of stem; (d) Fruit.

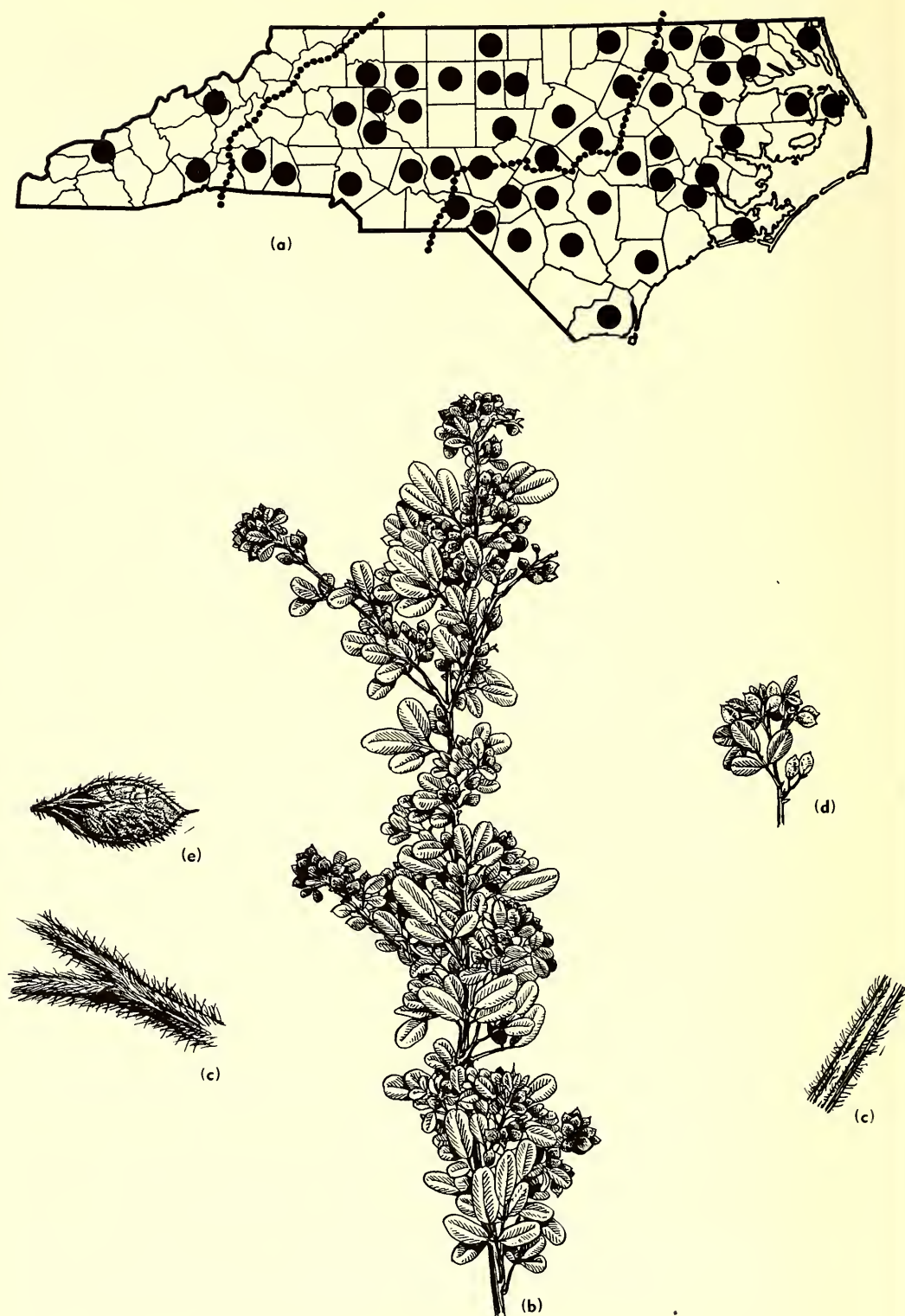


Fig. 89. *Lespedeza Stuevei*. (a) Distribution; (b) Habit sketch; (c) Enlarged section of stem; (d) Enlarged section of leafy stem with fruit; (e) Fruit.

6. *LESPEDEZA INTERMEDIA* (S. Wats.) Britt., Trans. N. Y. Acad. Sci. 12: 63. 1893.

Perennial herb with one or few to several, stiffly erect to somewhat arching, terete, inconspicuously but finely ridged and grooved, unbranched and virgate or branched stems (with the ascendent to spreading, few to many branches usually restricted to the upper half of the plant); the main stems usually (0.2)0.4-0.6(0.8) m high and with typically slender stems (near the base about 1-4(6) mm in diameter); usually sparsely to densely strigillose or more rarely ascendent-puberulent and becoming glabrate or nearly so below. Stipules mostly narrowly linear-subulate to setaceous, long-persistent, venation usually inconspicuous, strongly ascendent or in age often spreading, usually sparingly or more rarely densely appressed short-pubescent, usually 3-5 mm long. Petioles usually appearing slender and widely divergent, those of the principal leaves typically about 1-2(3) cm long, those of the smaller upper leaves mostly 3-7 mm long; usually sparsely to densely strigillose or appressed short-pubescent and macroscopically appearing glabrous. Leaflets usually oblong to oblong-elliptic or less commonly or especially in the smaller upper leaflets elliptic, ovate, obovate or suborbicular, the principal ones mostly 1.5-3(4) cm long and 0.8-1.5 cm wide with the upper leaflets and those of the small lateral branches about (0.5)0.8-1.5(2) cm long, usually about half as wide as long, obtuse to very broadly rounded; the upper surface usually glabrate to sparsely strigillose, the lower surface sparsely to densely strigillose or appressed short-pubescent. Petiolules usually densely appressed or ascending short-pubescent, mostly 0.8-1.2(1.8) mm long, that of the terminal leaflet attached to a sparsely to densely strigillose rachis of about 0.8-6 mm long. Leaves often wide-spreading and neither appearing crowded nor closely enveloping the stem. Flowers borne in usually dense, sessile to short-pedunculate clusters in the axils of many of the medial and upper leaves or appearing glomerate near apex of the stem; usually overtopped by the subtending leaves but the upper, often glomerate clusters commonly exceeding their small subtending leaves; the peduncles and inflorescence branches usually sparsely to densely strigillose or appressed short-pubescent with the similarly pubescent pedicels of the apetalous flowers about 0.5-1 mm long while those of the petaliferous flowers usually 1-4 mm long subtended by a reddish-brown, strigillose bract of about 0.6-1.5 mm long bearing a pair of similar bractlets just beneath the flower. Calyx usually densely

appressed short-pubescent to strigillose and without conspicuously elevated venation; the tube about 0.5-0.8 mm long in those apetalous flowers bearing fruit while 1.2-1.8(2) mm long in the petaliferous flowers; the lobes narrowly triangular and acute in the fruit-bearing apetalous flowers and narrowly linear, acute to acuminate, and 1.2-2.5(3) mm long in the petaliferous and with the lobes unequal with the two uppermost united for about one to two-fifths their length; the calyx of the petal-bearing flowers 3-5 mm long and greatly exceeded by the corolla. Petals purplish, about 5-7 mm long. Legumes usually formed from the inconspicuous apetalous flowers; elliptic to almost orbicular with elevated, reticulate venation and sparsely to densely strigillose, usually 3-7 mm long.

DISTRIBUTION: A native species widely ranging throughout eastern North America from Southern Maine to Wisconsin and eastern Kansas and south into Florida and eastern Texas.

7. *LESPEDEZA VIRGINICA* (L.) Britt., Trans. N. Y. Acad. Sci. 12: 64. 1893.

Perennial with one to few, stiffly erect, terete, finely grooved and ridged, unbranched or branched (the branches virgate, few to numerous, and usually restricted to the upper half) stems mostly (0.3)0.5-0.7(1.0) m high and near the base usually (1)2-4(6) mm in diameter; sparingly to densely spreading to appressed puberulent and usually becoming glabrate below. Stipules narrowly linear, long-persistent, striate, strongly ascendent or in age sometimes becoming divergent or even recurved, sparingly to copiously appressed short-pubescent, mostly 2-4 mm long. Petioles usually short and slender, mostly (0.3)0.5-1.2(2) cm long and usually strigillose or appressed short-pubescent. Leaflets mostly linear to very narrowly oblong, (0.6)1-2.5(4) cm long and (2)3-5(7) mm wide, mostly (3)4-6-times as long as wide, obtuse to broadly rounded at the short apiculate apex and usually with an obtuse to rounded base, the upper surface sparsely to copiously strigillose or becoming glabrate, the lower surface minutely but densely strigillose. Petiolules densely antorse-appressed, short-pubescent, mostly 0.5-1(1.5) mm long; the terminal leaflet attached to the 0.7-5 mm long rachis. Flowers borne in few to several-flowered (often 6-10) clusters in the axils of many, if not most, of the medial and upper leaves forming small compact racemes on mostly sessile peduncles almost invariably overtopped by the subtending leaves; the peduncles or inflorescence branches usually densely strigillose,



Fig. 90. *Lespedeza intermedia*. (a) Distribution; (b) Habit sketch; (c) Enlarged section of stem; (d) Enlarged section of leafy stem with fruit; (e) Fruit.

the pedicels also strigillose and about 0.5-1.2 mm long subtended by a reddish-brown, minutely strigillose, linear bract of about 0.8-1.2 mm long and with a pair of very similar bractlets of about 0.6-1 mm long at the base of the flower. Calyx densely strigillose or puberulent and without conspicuously elevated venation; calyx-tube about 1-2 mm long; the lobes narrowly linear, acuminate, 1.2-2.4 mm long, unequal, the two uppermost united for about half their length and paralleling one another closely; the calyx about 3-4.5 mm long and greatly exceeded by the corolla. Petals purplish, about 5-7 mm long. Legumes mostly formed from the much smaller apetalous flowers, broadly elliptic to somewhat oval or orbicular with its venation conspicuously elevated and reticulate, pubescence thinly strigillose, mostly 3-6 mm long.

DISTRIBUTION: A native species commonly found along the margins of woods and thickets and fields from New Hampshire and Wisconsin south to Florida and eastern Texas.

The present treatment will suffice for the majority of specimens encountered but a small percentage will be found that arouse doubts as to the adequacy of this arrangement in expressing the biological complexities of the group. *L. Stuevei* typically can be readily distinguished by its broad leaflets and spreading short-pubescent from *L. virginica* with its linear or linear-oblong leaflets and appressed pubescence. However, a reputed variant (var. *angustifolia* Britt. or forma *angustifolia* (Britt.) Hopkins, *Rhodora* 37: 265. 1935) of *L. Stuevei* possesses linear leaflets while a form of *L. virginica* (f. *Deamii* Hopkins, *Rhodora* 37: 265. 1935) approaches it as its stems are densely spreading-pubescent.

Hopkins distinguished the two forms as follows:

Upper surface of leaflets glabrous to strigillose with short hairs, lower surface merely appressed-pubescent; petioles of principal cauline leaves averaging 2.2 cm in length; calyx and pod commonly strigillose to strigose *L. virginica* f. *Deamii*.

Upper surface of leaflets tomentose-strigose with long hairs, lower surface more densely so; petioles of principal cauline leaves averaging 1.7 cm in length; calyx and pod commonly villous-canescens *L. Stuevei* f. *angustifolia*.

8. *LESPEDEZA CUNEATA* (Dumont)
G. Don, Gen. Hist. Dichlam. Pl. 2:
307. 1832.

Hedysarum sericeum Thunb., Fl. Jap. 287. 1784.

Anthyllis cuneata Dumont, Bot Cult. ed. 2. 6: 100. 1811.

L. sericea (Thunb.) Mig., Ann. Mus. Bot. Ludg.-Bot. 3: 49. 1867 but not that of Benth., 1852.

Perennial herb usually with several erect or strongly ascendent stems about 0.8-1.5 m tall arising from a short-lived woody crown with numerous, strongly ascendent, virgate branches and with dense, upwardly appressed, hyaline, strigose puberulence on each of the numerous fine ridges running the length of the stem. Stipules subulate-setaceous, about 1.5-12 mm long and usually less than 0.5 mm wide, sparsely appressed-puberulent, long persisting. Petioles slender, densely appressed puberulent, about 1-5 mm long or those of the lower and larger leaves up to 10 mm long. Leaflets narrowly oblong-cuneate to linear-oblong and mostly (0.6)1-2(2.5) cm long and (1.5)2-4(10) mm wide, conspicuously apiculate at the rounded, truncate or retuse apex, usually densely appressed short-pubescent on both surfaces and hence appearing grayish-green or even silvery, very short-petiolulate (usually less than 0.6 mm long). Flowers on very short peduncles in the axils of the median and upper leaves and usually equaling or shorter than the subtending leaf, borne solitary or mostly in clusters of 2-4 on upwardly appressed puberulent pedicels mostly 1 mm or less in length. Calyx upwardly appressed puberulent and closely subtended by 2 inconspicuous, appressed bractlets up to 1 mm long; the tube about 1-1.5 mm long and turbinate; the lobes lance-subulate and almost of equal length, about 2-3.2 mm long (in the petaliferous flowers). Petals creamy-white and marked with violet-purple especially along the veins of the standard, about 6.5-9 mm long. Legume oblong-elliptic, about 2.5-3 mm long, brown, very inconspicuously nerved, upwardly appressed-puberulent. Seed ovate, yellowish but speckled with brown.

DISTRIBUTION: Native of eastern Asia but widely cultivated and escaping throughout the Southeastern States from Virginia and southern Missouri and south to the Gulf of Mexico and reported from numerous localities in the North but apparently largely excluded from there by its reported lack of winter hardiness.

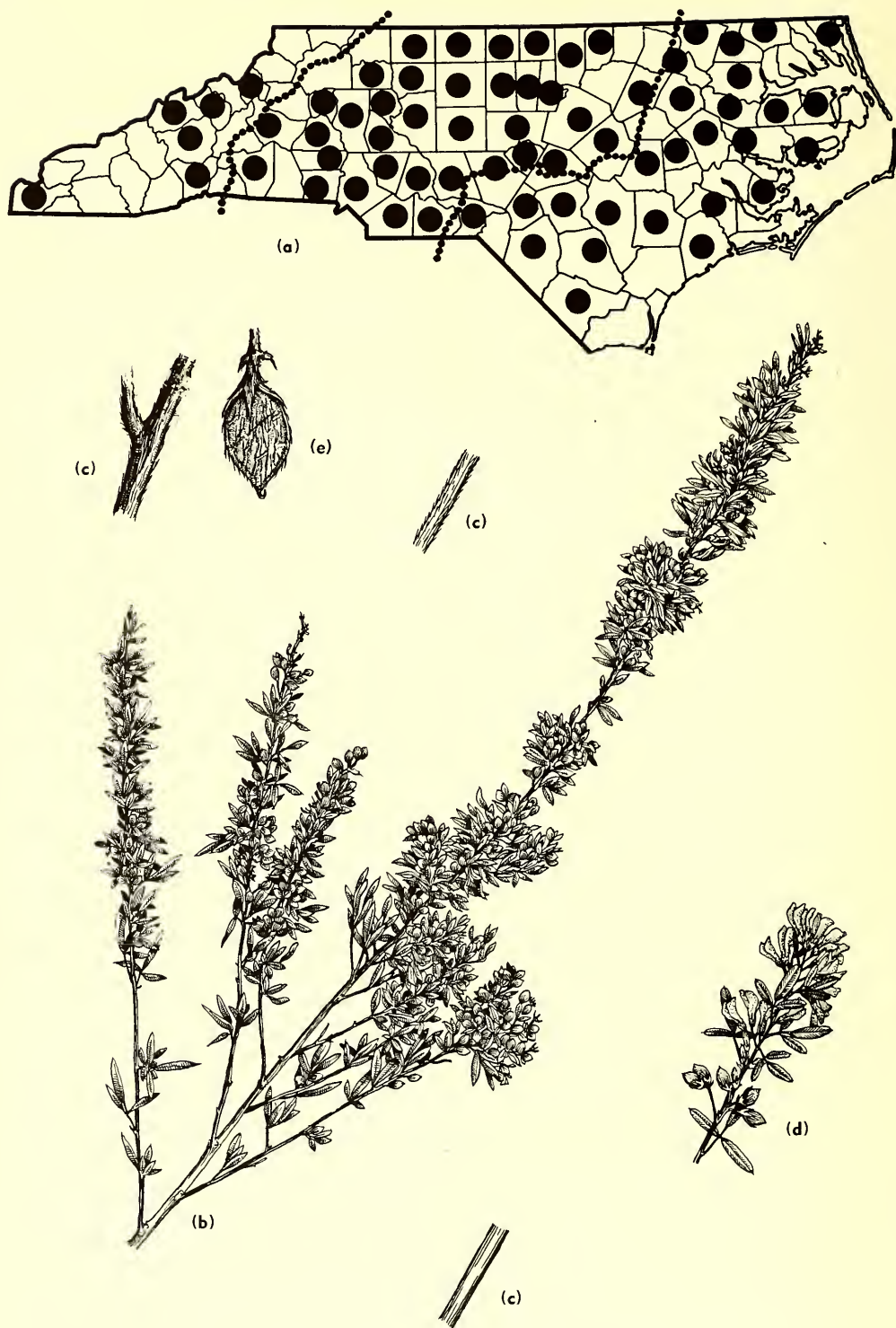


Fig. 91. *Lespedeza virginica*. (a) Distribution; (b) Habit sketch; (c) and (c') Enlarged section of stems; (d) Enlarged section of leafy stem with fruit; (e) Fruit.

One of the most widespread and familiar of all lespedezas and widely employed to control erosion on roadside banks and similar areas.

9. *LESPEDEZA HIRTA* (L.) Hornem., Hort. Havn. 699. 1807.

Perennial with few to several, erect, stiff, terete, finely ridged and grooved and below usually unbranched stems about 0.6-1.2 (1.5) m high and near the base up to 0.5-1.0 cm in diameter, usually densely pubescent with mostly wide-spreading, tawny to silvery, short- to long-pilose or even villous or sometimes the pubescence mostly short-curly puberulent and occasionally in age becoming nearly glabrate below. Stipules mostly very narrowly linear-subulate (although the lowermost are occasionally linear), long-persistent, striate, ascendent to strongly spreading or even recurved, densely spreading pilose to more or less appressed short-pubescent or even strigillose, about (2)3-6 (8) mm long. Petioles of the larger leaves slender and elongate, usually densely villous, pilose or occasionally puberulent, mostly ranging from (3)5-15 (25) mm long. Leaflets varying greatly in both shape and pubescence, mostly broadly oblong to oblong-orbicular or even oval or suborbicular to broadly obovate or less commonly broadly elliptic (in our specimens), mostly (0.8)1.5-3 (5) cm long and about (0.6)1.0-2 (3) cm wide, mostly about two-thirds or more as wide as long, obtuse to broadly rounded at the often shallowly retuse, short-apiculate apex and usually broadly rounded at the base, usually both surfaces pubescent but the upper less so than the lower, usually spreading-pilose beneath although occasional appressed and then the pubescence often of appressed-puberulent or even strigillose; the pubescence of the upper surface usually similar but often much more sparse and somewhat shorter but occasionally becoming glabrate or nearly so. Petiolules similar to the petiole in pubescence and about 1-2 mm long; the terminal leaflet appearing superficially long-petiolulate due to the slender rachis of about 3-8 (10) mm long. Flowers borne in numerous, dense to loosely arranged, spicate, often cylindrical racemes about 1-4 (6) cm long borne on peduncles arising from the axils of the leaves or terminating the upper lateral branches; the ascendent peduncles usually equaling or exceeding the subtending leaves and often slender and elongate, mostly 2-4 (5) cm long; individual flowers divergent to ascendent and varying from loosely arranged to compactly imbricate (especially so in fruit);

the pedicels inconspicuous, about 1-2 mm long and subtended by linear, reddish-brown, inconspicuous, short-pubescent bracts about 2-3 mm long and with a pair of nearly similar bractlets just beneath the flower of about 3-4 mm long. Calyx densely pubescent with spreading pilose pubescence and also with short and usually somewhat appressed puberulence, often one or the other pubescence-type predominating; venation obscured in flower but usually much more apparent in fruit and conspicuously elevated; calyx-tube about 1.2-1.8 (2) mm long; the lobes about 4-6 mm long, lance-linear, acute, inconspicuously unequal in length (since all terminate at about the same point from the base of the calyx but the lower-lobes separated from the calyx-tube at a lower point and hence the upper lobes are about 1 mm shorter); the calyx about equaling the corolla in length and enlarging somewhat with age. Petals yellowish-white and the standard with a purplish spot, mostly about 6-8 mm long. Legume oblong-ovate to elliptic, densely spreading short-pubescent, mostly (4)5-6 (7) mm long, approximating the calyx in length but usually 1-2 mm shorter than the lobes excluding the tapering style-base.

DISTRIBUTION: A species native to much of the eastern United States ranging from Maine south into peninsular Florida and west to southern Michigan and southwest into Missouri and eastern Texas.

This species forms with *L. capitata* a perplexing complex and one which obviously require much further study before even the specific boundaries are clearly understood. The range of variation usually encountered with *L. hirta* does not seem to be as great as seen in *L. capitata* and the differences noted within our material of *L. hirta* indicate that the variation is apparently almost continuous which would of course, if true, make it impossible to attempt to distinguish intra-specific variation within the species.

Fernald, whose study of this group was apparently the most extensive undertaken, recognized several varieties including three from North Carolina. His key is presented below to facilitate further study of the puzzling variation. Those varieties which were recognized by him as occurring within North Carolina are prefixed with an asterix.

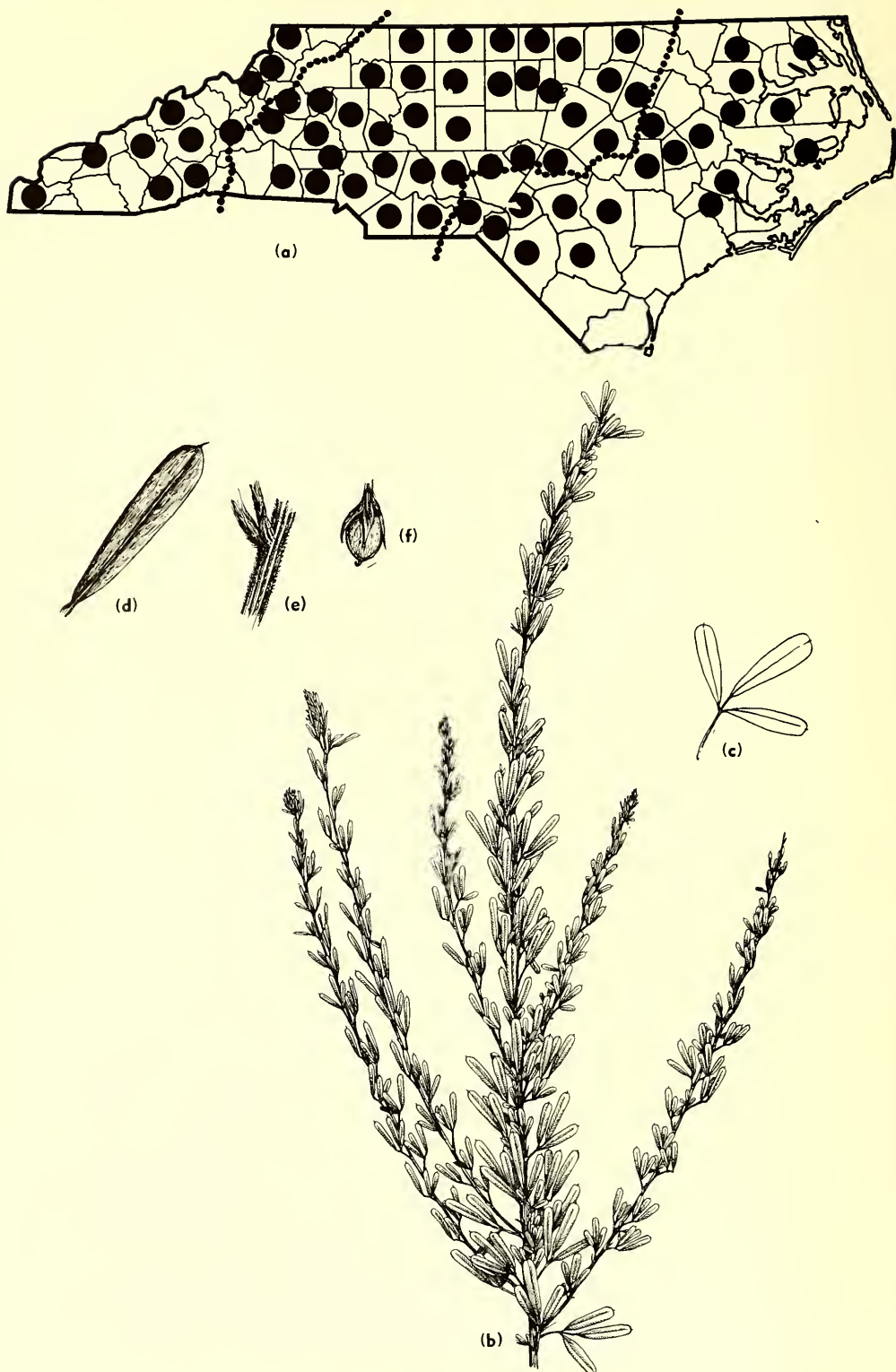


Fig. 92. *Lespedeza cuneata*. (a) Distribution; (b) Habit sketch; (c) Leaf; (d) Leaflet; (e) Enlarged section of stem; (f) Fruit.

1. Peduncles mostly overtopping their subtending leaves; racemes relatively open, in fruit 1.5-4.5 cm long.
2. Leaflets rounded-obovate to oblong-ovate, the terminal one of the primary leaves 1-3.5 cm broad.
3. Stem villous or copiously pilose; leaves pubescent beneath, at least on the veins, with spreading or spreading ascending hairs; terminal leaflet of primary leaves 2-6 cm long, 1.5-4 cm broad *var. *hirta*.
3. Stem densely short-pubescent; leaves grayish, silvery beneath and sometimes above with minute sericeous puberulence; terminal leaflet of primary leaves 1-2.7 cm long, 1-2 cm broad; southeastern *var. *appressipilis* Blake.
2. Leaflets narrowly oblong to linear, 6-10 mm broad; southern.
4. Leaflets oblong, the larger 2-3 cm long and 7-10 mm broad; calyx 6-8 mm long *var. *longifolia* (DC.) Fern.
4. Leaflets narrowly linear, the larger 3-7 cm long and 6-8 mm broad; calyx 8-10 long var. *intercurva* Fern.
1. Peduncles mostly much shorter than their subtending leaves, producing a virgate leafy inflorescence; racemes relatively compact in fruit, only 1-2.5 cm long; leaflets oblong, velutinous or sericeous, the larger ones 3-6 cm long and 1-2 cm broad; northern var. *dissimulans* Fern.

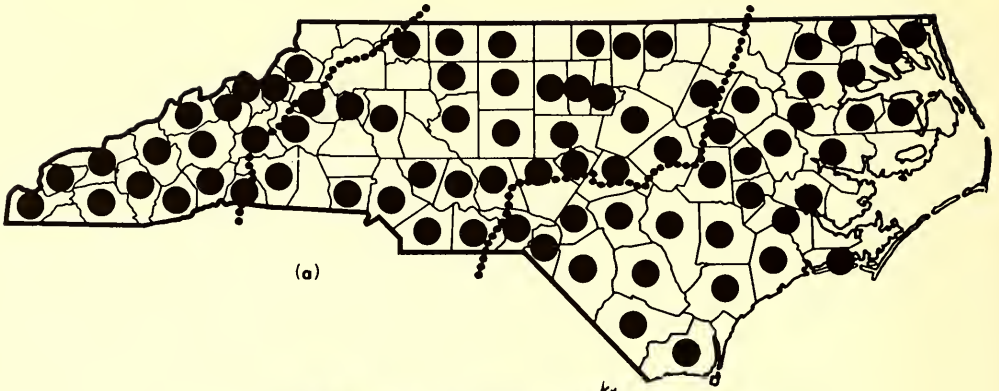
As is noted above the first three varieties have been reported from North Carolina while the fourth var. *intercurva*, is possibly to be expected since it is to be found in southeastern Virginia. Blake's variety *appressipilis* appears to be much more readily distinguished from variety *hirta* in more southernly portions of the Coastal Plain such as Florida and Georgia than it is in our area where attempts to assign our collection to the so-called varieties have not proven too satisfactory.

Fernald (1950: p. 927) states that this species forms hybrids with the following species: *L. procumbens*, *L. repens*, *L. virginica*, *L. capitata* and *L. angustifolia*. Turner (1959: p. 225) reports it to hybridize with *L. Stuevei*. Until the extent and results of such widespread hybridization are more fully investigated, it would seem futile to attempt infra-specific delimitation.

10. *LESPEDEZA CAPITATA* Michx., Fl. Bor. Am. 2: 71. 1803.

Perennial with few to several, erect, stiff, relatively stout, terete, finely ridged and grooved, mostly unbranched below (or at least but little branched) stems about (0.5)0.8-1.2(1.5) m high and up to 5-10 mm in diameter below and usually silvery to tawny with dense velvety pubescence especially above but below sparingly appressed- to spreading-pubescent or even glabrate. Stipules narrowly linear-subulate, striate, long-persisting, ascending to strongly spreading and mostly densely appressed short-pubescent and usually about 2-6 mm long. Petioles short and relatively stout, usually about 2-5 mm long and mostly densely velvety short-pubescent. Leaflets variable but mostly oblong to narrowly elliptic and averaging about 2.5-4-times as long as wide (but elsewhere occasionally linear-oblong to lanceolate), mostly (1.5)2-3.5(4.5) cm long and (5)6-12(15) mm wide, obtuse to broadly rounded at the apiculate apex (rarely acute in races from other regions), obtuse to broadly rounded (or rarely even acute) at the base, glabrous to appressed silky-pubescent above, thinly to densely sericeous to velutinous beneath and with very short, densely pubescent petiolules. Flowers clustered in numerous, very dense, glomerate or spicate racemes mostly found in the axils of the upper leaves with the individual flowers strongly ascendent and overlapping those above and consequently partly hiding them and the raceme axis from view and borne on pubescent, very short pedicels and with appressed pubescent, linear bracts and bractlets about 2-3.5 mm long and on usually velutinous, short peduncles mostly as long as or shorter than the subtending leaves (but occasionally exceeding them), mostly (0.5)1-2.5 cm long. Cleistogamous and apetalous flowers inconspicuous and hidden amongst the petaliferous flowers. Calyx densely appressed to spreading short-pubescent throughout and with the veins elevated; the tube about 1-1.5 mm long; the lobes lance-linear, subulate, inconspicuously unequal in length, mostly 6-11 mm long and all about equally free, and about as long as the corolla. Petals yellowish-white and the standard with a purplish spot, about 0.8-1(1.2) mm long. Legume ovate-oblong, very faintly nerved, densely ascendent short-pubescent, about (3.5)4-5(6) mm long and conspicuously shorter than the calyx-lobes.

DISTRIBUTION: A native species ranging from Maine and southern Quebec south into northern Florida and west into east-



(a)



(b)

Fig. 93. *Lespedeza hirta*. (a) Distribution; (b) Habit sketch.

ern Texas and South Dakota; found usually along dry sandy or clayey roadsides or edges of woods or fields.

For many years considerable morphological variation has been noted throughout the area of this wide-ranging species. Interpretation of this variation has resulted in several treatments indicating how their respective authors thought it best could be expressed. Fernald (1941 & 1950) recognized five taxa of varietal rank as comprising the species while most recent authors (including Fassett, 1939; Gleason, 1952; Gambill, 1953; and Isely, 1955) although equally aware of the considerable morphological diversity within the species, which to at least some extent is correlated with geography, have indicated that the variation was too continuous to permit the recognition of satisfactory subspecific taxa. Fassett felt that there was evidence that the so-called varieties did not necessarily produce offspring which resembled their parent and that there were at least eight types within Wisconsin which deserved recognition if any did. It would seem best, therefore, until a more extensive study is made of this complex, not to attempt here a formalized infraspecific classification.

Fernald's treatment is presented below in a slightly modified form to facilitate further study.

1. Lower surfaces of leaves with closely appressed or sericeous pubescence.
2. Leaflets oblong, elliptic, oval or obovate.
3. Leaflets oblong or narrowly elliptic; heads crowded and very short-peduncled among the upper leaves.
4. Leaves brilliantly silvery beneath, grayish and lustrous above; upper heads densely aggregated and mostly hiding the subtending leaves var. *capitata*.
4. Leaves opaque or only slightly lustrous beneath, green above; subtending leaves often exceeding the heads var. *vulgaris* T. & G.
3. Leaflets broadly elliptic-oval to rounded-obovate; some or all peduncles scattered and equal to or exceeding the subtending leaves var. *calycina* (Schindl.) Fern.
2. Leaflets lanceolate to lance-linear, usually sericeous beneath var. *stenophylla* Bissell & Fern.

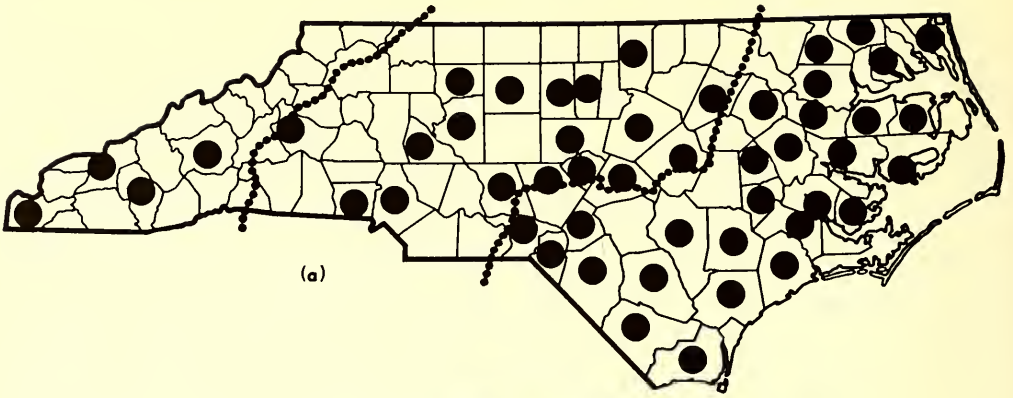
1. Lower surfaces of oblong to narrowly obovate leaflets velvety-pilose with dense dull cinereous pubescence; inflorescence leafy; northeastern .. var. *velutina* (Bickn.) Fern.

Three of these varieties recognized by Fernald were reported from North Carolina. These three morphological types are var. *capitata*, var. *vulgaris* and var. *calycina*; in addition var. *stenophylla* is perhaps to be expected since it is found in nearby southeastern Virginia. The var. *capitata* is by far the most abundantly represented in the herbarium collections studied. His var. *calycina* was originally described by Schindler as a variety of *L. hirta* which it strikingly resembled in the shape of the leaflet and its peduncled inflorescences but from which it differs in its merely sparsely pilose to subglabrous and elongate calyx-lobes which overtops the sparsely pilose legume and the lesser degree of pubescence than that found in *L. hirta*. The differences between *L. capitata* and *L. hirta* are admittedly not very strong and a comprehensive study of all of these taxa is needed throughout their extensive range. The inclusion of var. *calycina* within the limits of *L. capitata* seems on the basis of an admittedly hurried survey unwarranted and to render even more difficult the recognition and determination of the two species. The relationship of var. *calycina* is here thought to be with the so called var. *appressipilis* of *L. hirta*.

11. LESPEDeza ANGUSTIFOLIA (Pursh) Ell., Sk. Bot. S. C. & Ga.

2: 206. 1822.

Perennial with one to few, stiffly erect, terete, finely ridged and grooved, and usually unbranched (or branching only above) stems about (0.3)0.5-1.0(1.2) m high and near base about (2)3-4(5) mm in diameter and above usually densely upwardly strigillose or somewhat weakly or strongly spreading and stiff-pubescent to short-pubescent while below usually densely, even if inconspicuously, strigillose to glabrate. Stipules usually very narrowly linear to linear-subulate, long-persistent, striate, ascendent or more commonly widely divergent and even somewhat recurved, more or less densely appressed short-pubescent or also in addition with relatively few spreading short-pilose trichomes, mostly (2)3-4(5.5) mm long. Petioles usually very short, the



(a)



(b)

Fig. 94. *Lespedeza capitata*. (a) Distribution; (b) Habit sketch.

leaves appearing sessile or nearly so, mostly (1)2-5(10) mm long, almost always less than one-fourth the length of a leaflet and often less than one-tenth, typically densely appressed short-pubescent. Leaflets mostly narrowly oblong-elliptic to linear and (1.2)2-4(6) cm long and about 2-5(7) mm wide, mostly 4-12-times as long as wide, obtuse to broadly rounded at the shortly apiculate apex and usually with an obtuse to rounded base, the upper surface densely appressed short-pubescent or strigillose. The petiolules with dense appressed pubescence resembling that of the petioles and about 1 mm long; the terminal leaflet appearing somewhat longer petiolulate due to the almost indistinguishable rachis of about (0.5)1-2(4) mm long. Flowers borne in numerous, compact to loosely arranged, globose or more commonly short-cylindrical spicate racemes mostly about (0.7)1-2.5(3) cm long borne on peduncles arising from the leaf axils of the main or lateral stems or terminating branches; the ascending peduncles mostly about equaling or slightly exceeding in length the subtending leaves and (0.5)1-3(5) cm long; the peduncle and inflorescence branches densely upwardly spreading short-pubescent; the individual flowers upwardly spreading to strongly ascending and varying from loosely arranged to compactly imbricate; the pedicels short and inconspicuous, about 1 mm long and densely pubescent, subtended by a reddish-brown, appressed-pubescent, linear bract about 1.2-2 mm long and with a pair of similar bractlets of about 1.5-3 mm long just beneath the calyx. Calyx densely spreading-puberulent and with the venation usually apparent in flower and on the lobes especially so; calyx-tube about 1-1.5 mm long; the lobes about 4-6 mm long, lance-linear, acute to nearly subulate, appearing equal or nearly so; the calyx about 5-7 mm long and equaling the corolla in length or nearly so and enlarging but slightly with age. Petals yellowish-white, the standard with a more or less central purplish spot, mostly 5-7 mm long. Legume broadly elliptic to oblong-obovate, densely spreading short-pubescent, mostly (4)5-6 mm long and about equaling the calyx in length.

DISTRIBUTION: A native species of sandy places and savannas ranging from southeastern Massachusetts south to Florida and west to Louisiana.

From the material examined in this study, this species appears to be remarkably unvarying for a member of this genus. It obviously is closely related to *L. capitata* and *L. hirta*, whose varieties have some-

times been confused with it, but as treated here is refreshingly free of the numerous puzzling variations of the two more widespread and abundant species. There is, however, a relatively rare form with densely spreading short-pubescent stems scattered throughout much of the range of the species and it has been found in North Carolina. This is Fernald's form *subvelutina*.

12. *LESPEDEZA STIPULACEA* Maxim.,
Prim. Fl. Amur. 85. 1859.

Annual from a slender taproot about 6-12 cm long and mostly 1-3(5) mm in diameter with few to numerous, prostrate, spreading or ascendent to erect branches about (1)1.5-3(6) dm long and sparsely to densely, upwardly appressed, bristly pubescent. Stipules ovate to ovate-lanceolate, acute, varying in size but those on the main stems mostly 5-8 mm long and 3-4 mm wide but much smaller on the lateral branches, glabrous except for the minutely short-ciliate margin, brown and scarious. Petioles sparsely to densely upwardly appressed-hirsute, those on the principal stems mostly 4-10 mm long and hence the leaves appearing distinctly petiolate, those of the shorter upper branches frequently 2 mm or less in length. Leaflets spatulate to obovate, the principal leaflets usually (0.8)1-1.8(2.2) cm long and mostly about $\frac{2}{3}$ as wide as long, usually conspicuously cuneate at base and broadly apically emarginate and with a mucro about 0.3-0.5 mm long, glabrous or nearly so except for the conspicuously bristly-ciliate margins and lower midrib with their stiff, divergent to subappressed trichomes each about (0.4)0.6-1(1.2) mm long. Flowers borne in short, dense, spikelike racemes mostly 1-2(3.5) cm long and usually arising from the axils of the upper leaves but less commonly arising from the lower nodes; the pedicels slender and short, usually 2 mm long or less in length and usually partly hidden by the bract-like stipules. Calyx glabrous or very nearly so except for the very minutely short-ciliate lobes, mostly about 1.5-1.9 mm long of which the tube comprises about half; the lobes seemingly 4 in number due to the almost complete union of the upper two which hence appear as a single, broad, emarginate lobe, the other lobes ovate and usually obtuse to broadly rounded. Petals of the non-cleistogamous flowers about 6-7 mm long and strongly reflexed and hence appearing conspicuously shorter than the keel. Legume broadly oval to obovate, about 3 mm long, apically rounded, conspicuously reticulate

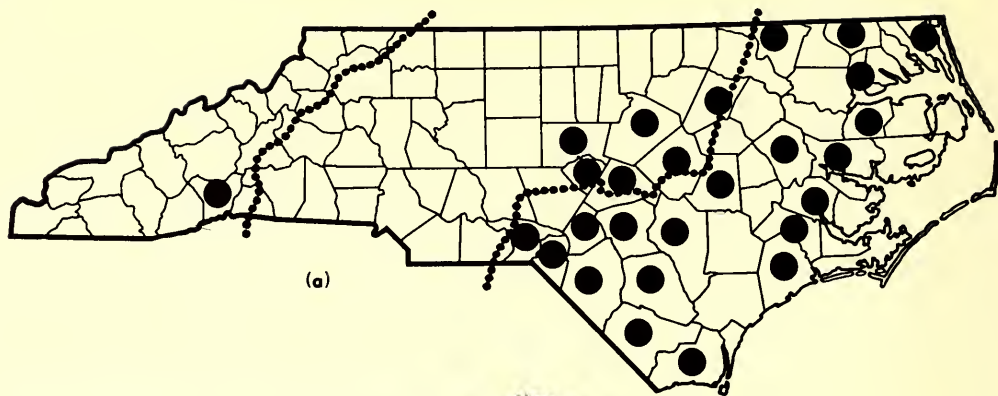


Fig. 95. *Lespedeza angustifolia*. (a) Distribution; (b) Habit sketch.

with black, cord-like ridges and often conspicuously glandular and covered only about $\frac{1}{2}$ or less by the adherent calyx. Seed solid purplish-black, unmottled.

DISTRIBUTION: Native of eastern Asia from whence it was apparently introduced in 1919 as a forage plant; now widely cultivated and escaping from Pennsylvania to Iowa southward at least to central Alabama and Georgia.

Several improved agronomic varieties of this species (Harbin and Early Korean) are grown in North Carolina especially in the upper Piedmont and mountainous sections. It has been estimated that this species, the KOREAN CLOVER, together with the other annual species, *L. striata*, produce approximately half of the hay harvested in North Carolina each year. It is very often found along roadsides and in other disturbed areas.

13. *LESPEDEZA STRIATA* (Thunb.) H. & A., Bot. Beech. Voy. 262. 1841.

Annual from a slender taproot about 5-10 cm long and about 1-4 mm in diameter with few to numerous, ascendent to wide-spreading or even decumbent branches and stems about 1-4 dm long and sparsely to densely supplied with retrorsely appressed or downwardly recurved, hyaline bristles. Stipules narrowly ovate-lanceolate, acute and usually 3-5(6) mm long and 1-1.8 mm wide, glabrous except for the minutely short-ciliate margin, scarious and light- to reddish-brown. Petioles sparsely to densely upwardly or divergently appressed-hirsute, usually 1-2 mm long and often almost completely hidden by the stipules and hence the leaves appearing nearly sessile or occasionally the petioles up to 5 mm long. Leaflets obovate to narrowly elliptic or oblong and mostly about 2-times longer than wide, usually rounded at base or at least not conspicuously cuneate, typically broadly rounded or even somewhat truncate at the apex or at least usually not emarginate and with a short, stout mucro about 0.2 mm long or less, and glabrous or nearly so except for the margin and the lower surface of the midrib with their stiff, closely appressed and consequently inconspicuous trichomes mostly less than 0.8 mm long. Flowers solitary or on very short peduncles in clusters of 2-5 arising from the leaf-axils of most of the nodes on the main stem; the pedicel slender and short, usually 1 mm or less in length and partly hidden by the subtending leaf and bract-like stipules. Calyx sparingly to densely short bristly-ciliate along the mar-

gin of the lobes and the reticulate principal veins, mostly (2) 2.5-3.5 mm long; the tube about 1-1.7 mm long; the lobes definitely 5 in number and almost of equal length but the two upper partly united and thus appearing somewhat shorter and the lobes ovate, ovate-oblong to ovate-lanceolate, obtuse to more commonly acute. Petals of the non-cleistogamous flowers about 4.5-6 mm long and pink or purple, the standard about 4 mm long and almost equaling the keel. Legume broadly oval to obovate, about 3-4 mm long, apically acuminate tapering to a distinct point or beak, inconspicuously reticulate and very inconspicuously glandular-dotted or eglandular and $1/2-4/5$ covered by the adherent calyx. Seed black and mottled with lighter areas.

DISTRIBUTION: Native of eastern Asia from whence it was apparently introduced before the middle of the last century and now is found widely cultivated and as an escape from Pennsylvania to Kansas and south to the Gulf of Mexico.

This annual species together with the closely related *L. stipulacea* is one of the most important forage crops in North Carolina and the two are reported to yield approximately half of the hay cut every year in the state. JAPANESE CLOVER, as *L. striata* is commonly called, is principally grown in the Coastal Plain and in the southern Piedmont usually in one of its improved strains such as Kobe or Tennessee 76.

27. *SESBANIA* Scop., Introd. 308. 1777.
*nom. conserv.**

Sesban Adans., Fam. Pl. 2: 327, 604. 1763.

Herbs or shrubs with even-pinnately compound leaves with rachis ending in a setaceous point and with numerous estipellate, entire leaflets and deciduous stipules. Racemes axillary with a caducous bract subtending each pedicellate flower. Calyx closely subtended by a pair of caducous bractlets; the tube broadly campanulate, usually broader than high, regular or nearly so; the lobes shorter than the tube, equaling one another or very nearly so, triangular, acute to acuminate. Corolla papilionaceous, yellow or the standard dotted, streaked or tinged with purple; standard reflexed, longer than the other petals, with a suborbicular, emarginate blade and a short claw; the wing-petals ob-lanceolate to oblong with claw about $\frac{1}{4}$ - $\frac{1}{2}$ as long as blade; keel-petals auriculate, strongly arching, with elongate claws about as long as blade. Stamens diadelphous, 9 and

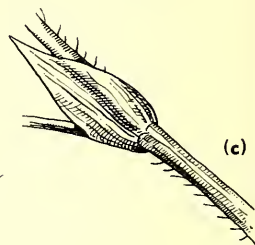
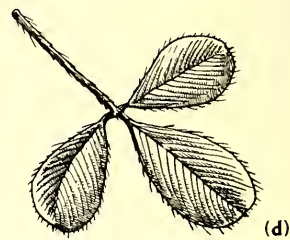
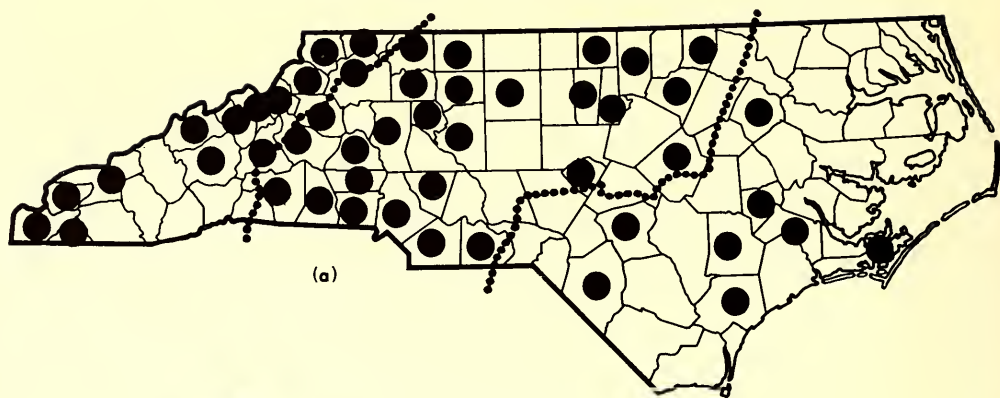


Fig. 96. *Lespedeza stipulacea*. (a) Distribution; (b) Habit sketch; (c) Enlarged section of stem showing ascending pubescence.

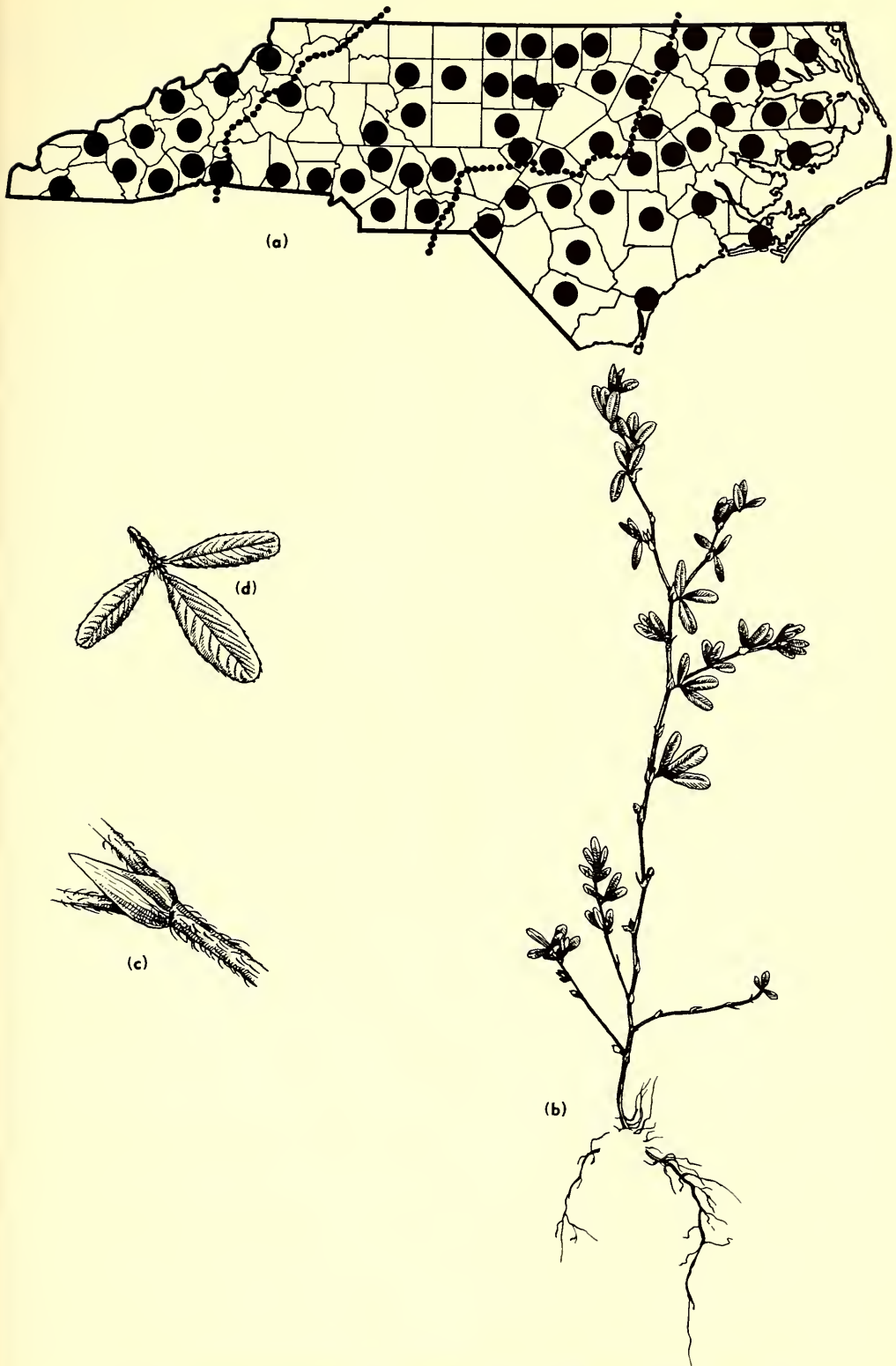


Fig. 97. *Lespedeza striota*. (a) Distribution; (b) Habit sketch; (c) Enlarged section of stem showing retrorse pubescence; (d) Leaf.

1, the tube slightly swollen to one side at base. Legume linear, slender, terete or more commonly somewhat compressed, short-stipitate, beaked, with numerous seeds separated by cross-walls.

A genus of about 30 species of the tropics and subtropics of both hemispheres. (Name derived from *sesaban*, said to be the Arabic name of one of the species.)

*The authority for the generic name and the synonymy presented here is that of the current Code (1961, p. 270) but it has been recommended (Taxon 8: 293, 1959) that the name *Sesbania* be credited to Adanson as corrected by Scopoli. In my opinion the former treatment was more in accord with the facts and hence preferable. It would seem unusual to say the least to find Adanson's "*Sesbania*" in the list of conserved names and what he actually published in the list of rejected generic names. The citation as to authority for the binomial of our only species would appear to be needlessly complex due to the above-mentioned suggested ruling. If we can attribute the generic name *Sesbania* to Adanson, it would then appear only logical to consider Rydberg as the author of the combination *Sesbania exaltata*—a combination that he never made. More strict adherence to Article 73 of the present Code would seem desirable upon the part of all.

There is probably little justification that can be presented in defense of here accepting *Sesbania*, *Daubentonia* and *Glottidium* all as separate genera. Turner (1955) reviewed the cytological evidence that formerly was thought to provide some support for segregation and concluded that their chromosome numbers provide "another character that links the subgenera together." Phillip and Hutchinson (1921) in their review of this problem in conjunction with their study of the African species accept the monotypic *Glottidium* as deserving generic status but conclude that *Daubentonia* had better be treated as a section of *Sesbania*. One of their principal arguments for this decision was that species of *Daubentonia* were to be found in three widely separated areas: North America, temperate South America and tropical East Africa. This disjunct distribution was thought to point to separate origins of the species-groups of *Daubentonia* from the basal *Sesbania*-stock. A polyphyletic section apparently was philosophically acceptable to them while a polyphyletic genus was not. Since the morphology of the fruit is so distinctive and as flowering representatives of our few species of this alliance can be determined with ease, they are here treated as belonging to separate genera—an admittedly arbitrary decision as many are at this stage of the science.

1. *SESBANIA EXALTATA* (Raf.) Rydb. ex A. W. Hill, Ind. Kew. 7: 223. 1929.
(superfluous combination by Cory in Rhodora 38: 406. 1936.)

Darwinia exaltata Raf., Fl. Ludov. 137. 1817.

S. macrocarpa Muhl., Cat. 65. 1813 nom. nud.; Muhl. ex. Nutt., Gen. 2: 112. 1818. descr.

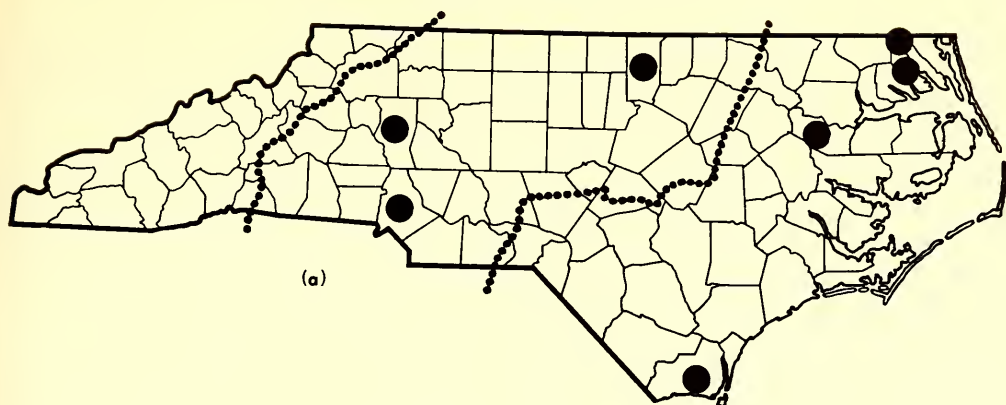
Sesban exaltata (Raf.) Rydb., N. Am. Fl. 24: 204. 1924.

Annual herb about 0.7-2(4) m high with glabrous, terete to slightly angled stems and wide-spreading branches. Stipules linear-lanceolate, attenuate, soon deciduous, about 1 cm long. Petioles about 3-10 mm long. Leaves about 1-3 dm long and even pinnately compound; leaflets 20-70 in number, linear-oblong with obtuse to truncate and mucronate apex and an acute to obtuse base, mostly 1-3 cm long and about 2-6 mm wide, glabrous, somewhat glaucous beneath with petiolules about 1 mm long. Racemes axillary, shorter than the subtending leaves, about 2-8 cm long with a slender, flexible rachis on a slender peduncle about 2-4 cm long with about 2-6, loosely arranged flowers about 0.5 cm long on slender, flexible pedicels about 0.5-1 cm long subtended by a linear-subulate, caducous bracts about 4-6 mm long. Calyx closely subtended by 2 linear, caducous bractlets about 3-4 mm long (these falling early and usually gone at time of anthesis or very soon thereafter); glabrous; the tube broadly campanulate, about 3-4 mm long and 4-5 mm wide; the lobes triangular-subulate, equaling one another or nearly so, much shorter than the tube, about 1-1.5 mm long. Petals yellow and often purple spotted; standard about 1.2-1.5 cm long, wing and keel petals shorter. Legume linear, glabrous, about 1-2 dm long, 3-4 mm wide and 1 mm thick with much-thickened sutures and a beak about 0.5-1 cm long, 30-40-seeded, the fruiting stipe less than 5 mm long.

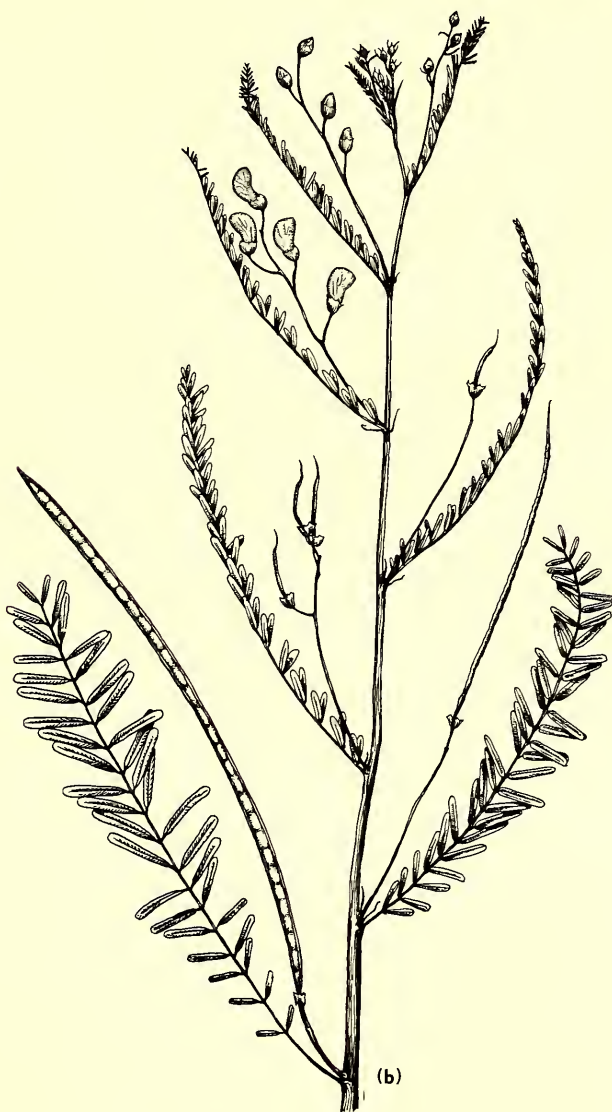
DISTRIBUTION: Florida to Texas and north to southern Missouri, adventive locally northward, especially along the coast to southeastern New York.

28. *GLOTTIDIUM* Desv., Jour. de Bot. II. 1: 119. 1813.

Annual herb somewhat woody at base with erect stems about 1-4 m high and even-pinnately compound leaves each with numerous, entire, estipellate leaflets and deciduous linear stipules. Inflorescence an axillary raceme or occasionally branching below and then



(a)



(b)

Fig. 98. *Sesbania exaltata*. (a) Distribution; (b) Habit sketch.

paniculate. Flowers pedicellate, each pedicel subtended by a caducous bract and with a pair of caducous bractlets at or near the summit of the pedicel. Calyx-tube campanulate, conspicuously oblique; the lobes small, broadly triangular and acute, equaling one another or nearly so. Corolla papilionaceous; the standard with a broad, emarginate, reniform, reflexed blade and a short claw; the wings with an oblong blade about twice as long as the arching claw and auriculate at base; the keel with the longest claw and about equal to the wing and standard in length. Stamens diadelphous, 9 and 1. Legume long-stipitate, beaked, flattened, oblong to elliptic, more or less tapering to each end, (1)2-seeded, the valves separating at maturity into 2 layers, the outer thicker, the inner thin and papery-membranous.

A monotypic genus of the West Indies and the South Atlantic and Gulf Coasts of the United States. (Name derived from the Greet *glotta* = tongue and *idium* = small.)

1. *GLOTTIDIUM VESICARIUM* (Jacq.) Harper, Bull. Torrey Club 28: 472. 1901.

Sesbania vesicaria (Jacq.) Ell., Bot. S. C. & Ga. 2: 222. 1823.

Annual herb with stems woody at base and 1-2(4) m high, glabrate to appressed-pubescent above. Stipules linear-attenuate, about 1 cm long, soon deciduous. Petioles short, about 5-8(10) mm long. Leaves even-pinnately compound, about 1-1.5 dm long; leaflets 20-40(52), each about (1)1.5-3(4) cm long and about 3-6 mm wide, oblong to somewhat elliptic, broadly rounded at apex and with a prominent mucro about 0.2-1 mm long and with an obtuse to acute base, glabrous to silky-pubescent, attached to the glabrous to pubescent rachis by a petiolule about 1-1.5 mm long. Racemes (or sometimes panicles) axillary, mostly 8-14 cm long with 5-15, loosely aggregated flowers about 8-10 mm long on pedicels about 5-12 mm long subtended by caducous, usually short-pubescent, linear to narrowly lanceolate, subulate bracts about 3-6 mm long. Calyx closely subtended by 2, linear, acute to acuminate, caducous bractlets about 1-2 mm long, glabrous to sparsely short-pubescent; the tube obliquely campanulate, about 2-3 mm high and about 3-5 mm broad; the lobes broadly triangular to almost mere undulations but with acute tips about 0.2-0.8 mm high. Petals subequal in length, about 8-10 mm long, yellowish or tinged with pink or dark-red. Ovary stipitate. Legume with stipe about 1-2 cm long and 1-1.5 mm thick and

with a beak about 5-7 mm long; the flattened body somewhat oblong to elliptical and about 2.5-8 cm long and 1.5-2 cm wide.

DISTRIBUTION: The Coastal Plain from southeastern North Carolina south to Florida and west to Texas; also found in the West Indies from which the *BLADDER-POD* was perhaps introduced.

29. *DAUBENTONIA* DC., Mem. Leg. 285. 1826.

Shrubs or trees with even-pinnately compound leaves, soon-deciduous stipules and numerous, estipellate, entire leaflets. Racemes axillary with several to numerous, large flowers on pedicels subtended by a caducous bract and with 2 minute, caducous bractlets near top of pedicel and just below the calyx. Calyx-tube rounded-campanulate, broader than high; the lobes small, acute to obtuse, often little more than undulations. Corolla papilionaceous, yellow, roseate to reddish-purple; the standard with an emarginate, orbicular blade and short claw, the wing- and keel-petals lacking basal auricles. Stamens diadelphous, 9 and 1. Ovary stipitate. Legume 4-angled or 4-winged, beaked, stipitate, usually oblong-linear, coriaceous with the several to numerous seeds separated by cross-partitions.

A genus of about 5 species extending from South America into Mexico and the southern United States and according to Phillips and Hutchinson (1921) also native to East Africa. Named in commemoration of Ludwig J. M. Daubenton, 1716-1799, a physician and naturalist.)

DAUBENTONIA PUNICEA (Cav.) DC., Mem. Leg. 286. 1826.

Sesbania punicea (Cav.) Benth., Fl. Bras. 15 (1): 43. 1859.

Shrub about 1-2 m high or occasionally becoming a small tree with terete, slightly striate, often purplish, glabrous to sparsely appressed stems usually short-pubescent above. Stipules deciduous, oblong-linear, about 4-6 mm long, brownish. Petioles mostly about 1-2 cm long, longer than the width of the lowermost leaflet. Leaves even-pinnately compound, about 1-2 dm long, wide-spreading; leaflets 12-40, linear-oblong, obtuse or rounded and mucronate at the apex, acute or obtuse at base, about 1-3 cm long and 4-7 mm wide, glabrous or more or less strigose with petioles about 1-1.5 mm long. Racemes axillary, about 5-10 cm long including the 1-3 cm long

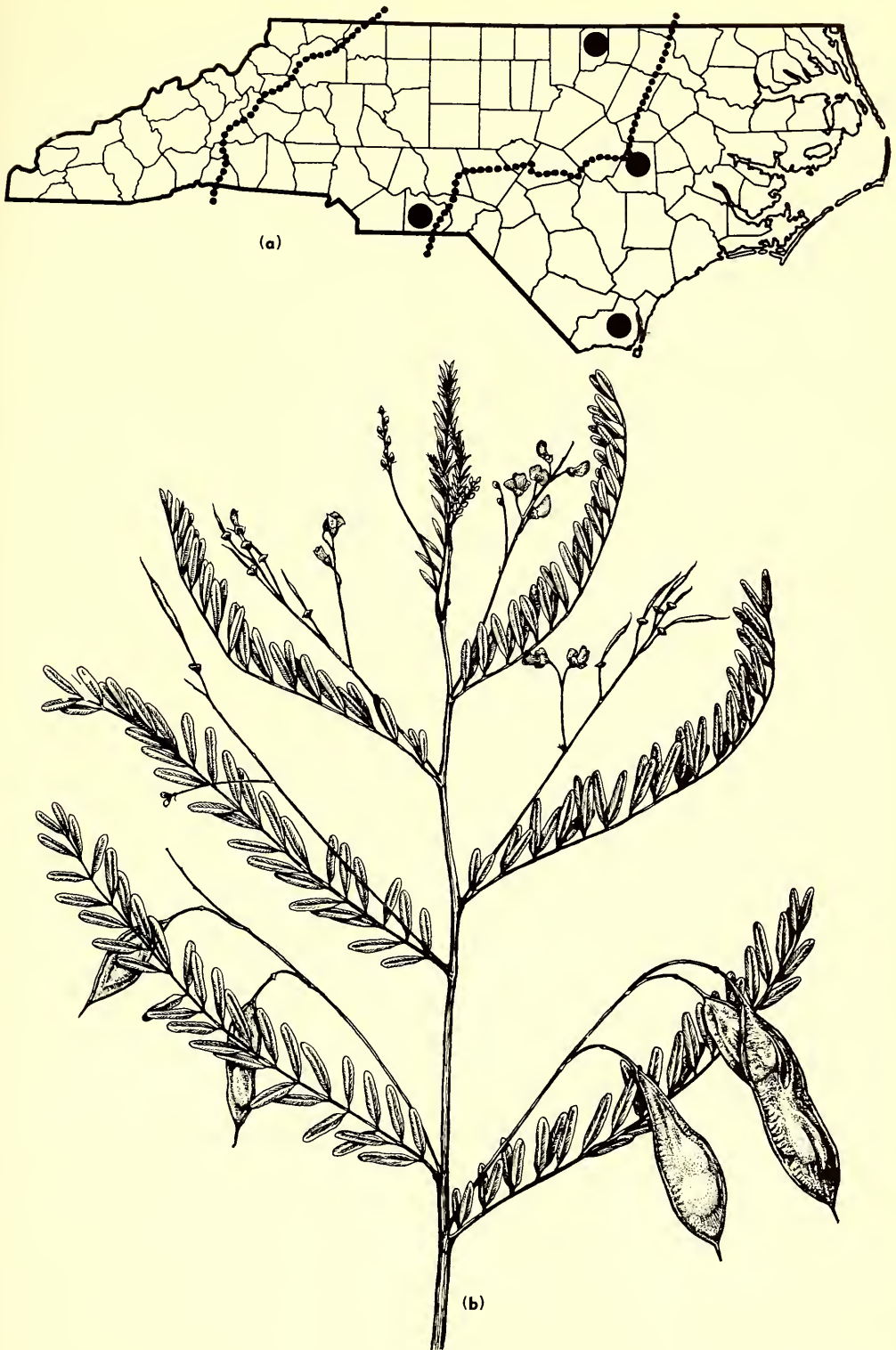


Fig. 99. *Glottidium vesicarium*. (a) Distribution; (b) Habit sketch.

peduncle with numerous flowers about 1.2-2.5 cm long attached to the very sparsely short-pubescent rachis by pedicels mostly 5-10 mm long subtended by a caducous, narrowly triangular, subulate bract about 2 mm long. Calyx campanulate, broader than high, purplish-red, glabrous; the tube about 3-4 mm high and about 6-8 mm wide; the lobes shallow and broad, about 0.5-1 mm high, acute to obtuse. Petals reddish-purple, the standard about 1.2-2.5 cm long, more or less orbicular and emarginate, wing and keel petals almost as large. Legume about 5-8 cm long and 1.2-1.5 cm thick, strongly 4-winged, more or less septate and coriaceous, borne on stipe about 0.5-1.5 cm long.

DISTRIBUTION: Native of South America but widely planted along the South Atlantic and Gulf Coasts and becoming naturalized.

30. *WISTERIA* Nutt., Gen. 2: 115. 1818.
nom. conserv.

Kraunhia Raf., Med. Repos. II. 5: 352.
1808. *nom.*

Shrubs with twining branches or high-climbing woody vines with odd-pinnately compound leaves and caducous stipules and entire, petiolulate, stipellate leaflets. Racemes terminal, pendant, with caducous bracts and large, pedicellate flowers. Calyx campanulate, more or less 2-lipped; the 2 upper lobes broad and united almost to the apex, the lower lobes narrow and distinct. Corolla papilionaceous, blue to purplish or white, with the petals nearly equal in length; the standard reflexed with a suborbicular blade and usually with two horn-like appendages near its base and the apex of the very short claw; the wings moderately to prominently auriculate at base; the keel-petals upwardly curved and basally auriculate, united above and clawed. Stamens diadelphous, 9 and 1. Ovary stipitate; the stipe surrounded by a collar-like, intrastaminal glandular-ring; the style inflexed and the stigma small and capitate. Legume stipitate, flattened, elongate, with several seeds and often slightly constricted between them, dehiscent although sometimes tardily so.

A genus of about 7 species of the eastern United States and eastern Asia. (Named in commemoration of Caspar Wistar, 1761-1818, professor of medicine in Philadelphia.)

It should be noted that *Wisteria* is perhaps better considered a member of the tribe Phaseoleae than to the tribe Galegeae

to which it was assigned by most of the monographers of the family. The presence of the intrastaminal disk in *Wisteria* and the genera related to it is a feature otherwise unknown in the Galegeae but is typical in the Phaseoleae. Moore (1936, p. 289) in his brief anatomical survey of the family also points out that *Wisteria* resembles the Phaseoleae in having but one series of vascular strands servicing the perianth, stamens and disk while the Galegeae and most other tribes of the Leguminosae possess two series of vascular traces and gaps.

1. Ovaries and legumes glabrous; pedicels and often the calyces and rachises with at least some club-shaped glands; calyx-tube 5-6 mm high and with a diameter less than the height of the tube; racemes 1.5 dm long or less; basal lobe or auricle of wing-petal linear and 5 mm long or longer 1. *W. frutescens*.

1. Ovaries and legumes densely velvety-pubescent; pedicels and the calyces and rachises entirely lacking club-shaped glands; calyx-tube at anthesis mostly 3-5 mm high and its diameter greater than the height; racemes mostly 1.5 dm long or more; basal lobe or auricle triangular and less than 2 mm long.

2. Leaflets 7-13; racemes 1.5-2 dm long and about 8-10 cm in diameter; flowers 2.3-2.6 cm long on pedicels 1.5-2.5 cm long and opening almost simultaneously throughout the inflorescence 2. *W. sinensis*.

2. Leaflets 13-19; racemes 2-5 dm long and about 5-7 cm in diameter; flowers 1.5-2 cm long on pedicels 1-2 cm long and opening gradually from base of inflorescence to apex 3. *W. floribunda*.

1. *WISTERIA FRUTESCENS* (L.) Poir.,
in Lam. Tabl. Encyc. 3: 674. 1823.

Kraunhia frutescens (L.) Greene, Pittonia
2: 175. 1891.

High-climbing, woody vine about (3)10-15 m high with younger branches appressed short-pubescent to villous but glabrous after the first year and becoming reddish-brown. Stipules lanceolate, caducous, about 2 mm long. Petioles about 2-6 cm long. Leaves about 1-3 dm long and mostly with 9-15, oblong, ovate-oblong to ovate-lanceolate leaflets with broadly rounded to obtuse bases and acuminate tapering to the blunt but apiculate apices, glabrate above at maturity, but

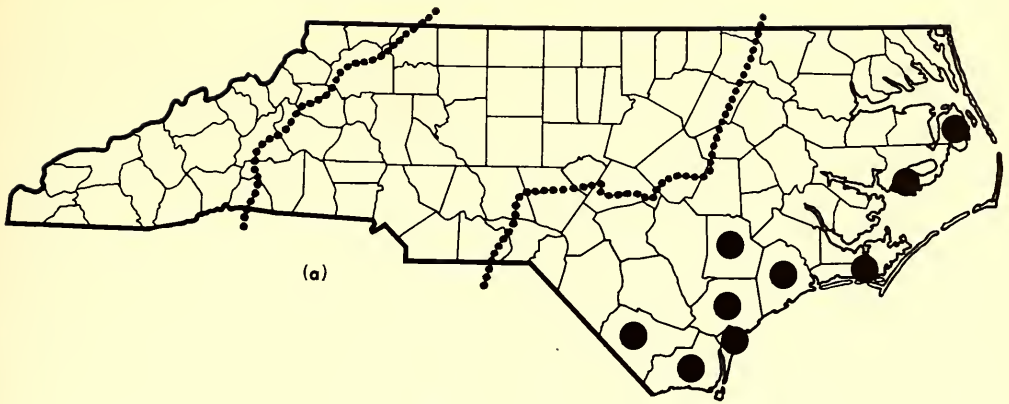


Fig. 100. *Daubentonia punicea*. (a) Distribution; (b) Habit sketch.

densely short-pubescent while expanding but below densely appressed-pubescent even at maturity, with a somewhat revolute margin, when mature about 2-6 cm long and 1-2.5 cm wide and with a short-pubescent petiolule about 1.5-2 mm long and a minute, setaceous stipel about 2 mm long. Racemes densely flowered, mostly 4-12 cm long with very densely short-pubescent pedicels about 4-6 mm long subtended by elliptical to ovate-lanceolate, caducous, densely short-pubescent and often sparsely to densely clavate-glandular bracts about 9-12 mm long. Calyx densely short-pubescent and often with few to numerous, club-shaped glands; the tube campanulate, mostly 5-6 mm high; the lobes unequal, the upper two lobes more or less ovate, or sometimes connate and then often obsolete, obtuse, about 2.5-3 mm high, the lateral lobes oblong to lanceolate, acute, about 3 mm long, the lowermost slightly longer. Petals blue-purple to lilac, about 1.5-2 cm long; the wing-petals with a slender, linear auricle at base of blade about 5-7 mm long. Ovary glabrous. Legume linear, 5-10 cm long and about 12 mm wide, glabrous, tapering to either end.

DISTRIBUTION: Southeastern Virginia south along the Coastal Plain to Florida and west at least to Alabama.

All the material from North Carolina seen by me possessed at least some clavate glands on the pedicels and calyx and often these glands were abundant. This character supposedly helped to distinguish *W. frutescens* from the reputedly specifically distinct *W. macrostachya* Nutt. (= *W. frutescens* var. *macrostachya* (Nutt.) T. & G.) of the Mississippi Basin which supposedly has a moderately to densely clavate-glandular calyx in contrast to the eglandular to sparsely glandular calyx of *W. frutescens*. The differences when reduced to paper are not convincing.

2. WISTERIA SINENSIS (Sims) Sweet, Hort. Brit. 121. 1827.

Kraunhia sinensis (Sims) Makino, Bot. Mag. Jap. 24: 297. 1910.

Shrub with twining branches or a high-climbing woody vine up to 10-15 m high with the current season's branches densely short-pubescent but glabrous after the first year and then becoming pale brown to grayish. Stipules soon deciduous. Petioles mostly 5-10 cm long and with a large swollen pulvinus about 5 mm in diameter. Leaves mostly 1.5-

3(4) dm long and typically with (7)9-11(13), ovate to elliptic leaflets with a broadly cuneate or obtuse base and an acuminate apex, nearly glabrous above and below at maturity or but slightly appressed, short-pubescent but densely appressed silky pubescent when first expanding, mostly (4)6-8(10) cm long and (2)3-5(6) cm wide with a densely puberulent petiolule about 3-5 mm long and subtended by a setaceous stipel about 4 mm long. Racemes densely flowered, mostly 1.5-3 dm long each with a very densely spreading-puberulent rachis bearing flowers about 2-3 cm long on flexible, spreading-puberulent pedicels about 1-2 cm long subtended by a caducous, strongly arching, hood-like, tawny-pubescent, acuminate bract about 1-1.5 cm long. Calyx densely short-pubescent; the tube campanulate, mostly 3-5 mm high; the lobes very unequal, the upper two nearly completely connate with but triangular teeth about 0.2 mm long, the lateral and lowermost lobe very much more pronounced, acute to acuminate, triangular, 3-4 mm long. Petals deep bluish-violet or rarely white; the wing-petals with a small, triangular, basal auricle about 0.8-1.0 cm long. Ovary densely short-pubescent. Legume oblanceolate, 10-15 cm long and up to 3 cm wide, often somewhat torulose, densely velvety pubescent.

DISTRIBUTION: A widely cultivated shrub or high-climbing vine in the south-east and introduced from China.

3. WISTERIA FLORIBUNDA (Willd.) DC., Prodr. 2: 390. 1825.

Kraunhia floribunda (Willd.) Taub., in E. & P. Nat. Pfl. 3(3): 271. 1894.

Shrub with twining branches or high-climbing vine about 10-15 m high. Leaves about 2-3 dm long with (13)15-19 leaflets, ovate-elliptic to ovate-oblong, mostly about 4-8 cm long, acuminate, rounded at base, at first appressed-pubescent becoming glabrate at maturity. Racemes about 2-5 dm long, slender, about 5-7 cm in diameter, with numerous, fragrant flowers about 1.5-2 cm long opening gradually from base of inflorescence to apex on slightly pubescent pedicels about 1.2-2.5 cm long. Calyx campanulate, the pubescence simple and lacking club-shaped glands. Ovary densely short-pubescent. Legume velvety-pubescent, 1-1.5 dm long, narrowing to the base.

Introduced from eastern Asia.

This species is included here but most if not all of the material planted in North Carolina appears to be *W. sinensis*. The two species are reported to hybridize.

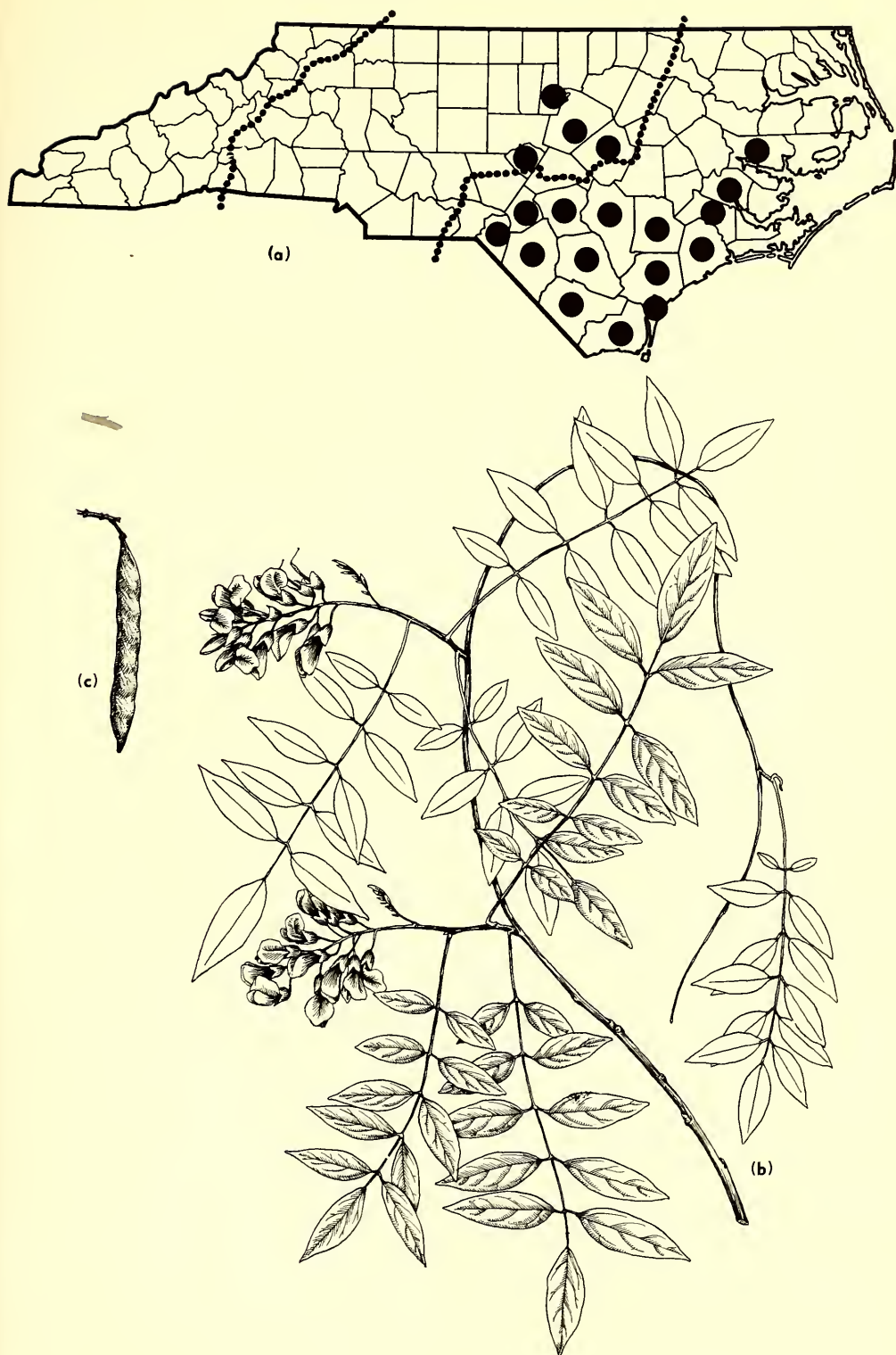


Fig. 101. *Wisteria frutescens*. (a) Distribution; (b) Habit sketch; (c) Fruit.

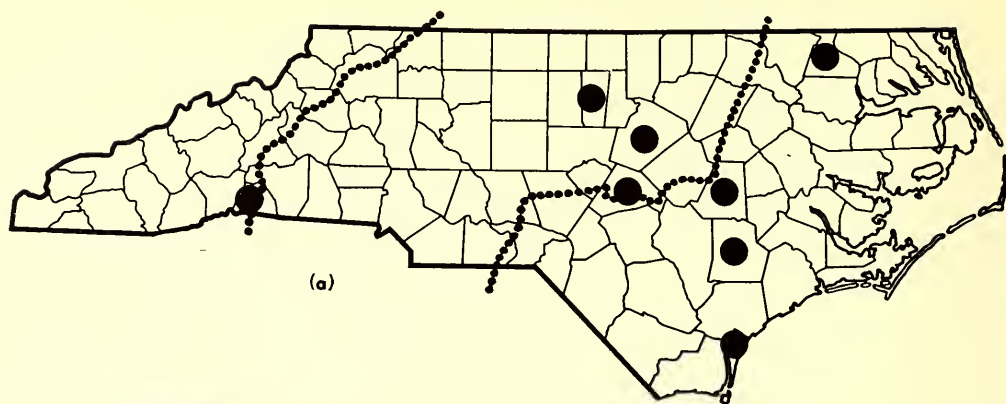


Fig. 102. *Wisteria sinensis*. (a) Distribution; (b) Habit sketch; (c) Fruit.

31. *ROBINIA* L., Sp. Pl. 722. 1753; Gen Pl. ed. 5. 322. 1754.

Trees or shrubs often spreading by under ground stems with petiolate, odd-pinnately compound leaves with entire, stipellate leaflets and setaceous to spinose stipules. Racemes axillary on the current year's growth, pendulous to ascendent, with long-pedicellate flowers subtended by caducous bracts. Calyx campanulate, more or less 2-lipped; the upper 2 lobes shortest and coherent for part of their length; the lower 3 lobes longer and more deeply divided, about equal. Corolla papilionaceous, the petals clawed, about 1-3 cm long, white, pink, roseate or purple; the standard obcordate to suborbicular or nearly so, more or less reflexed; slightly longer than the other petals; the wings obliquely oblong to obovate, free, with a basal auricle; the keel-petals incurved, united above, basally auriculate. Stamens monadelphous, the uppermost stamen united to the tube for about $\frac{2}{3}$ of its length. Ovary somewhat stipitate; style inwardly curved and with short area of dense pubescence near summit; stigma terminal, very small. Legume linear, compressed, short-stipitate and with thin, membranous valves.

A genus of perhaps as many as 20 species restricted to North America. (Named in commemoration of Jean Ro'bin (1550-1629) and his son, Vespasian Robin (1579-1662), herbalists and botanists of the king of France.)

A most baffling genus and one but little understood at the present time. Hybridization is widespread and many of the so-called species are no more than sterile, triploid, vegetatively reproducing hybrids. A high percentage of pollen sterility and the failure of many "species" to produce fruit is indicative of this (Whitaker, 1934). Critical study of the genus in the field, experimental garden and herbarium is obviously needed before anything approaching a satisfactory treatment can be presented. Previous accounts of the genus, when at all original, have differed widely in interpretation of characters and entities. Clausen (1940) fittingly concluded that "as now interpreted in taxonomic literature, the Robinias of the Southeastern United States are in great confusion."

Largely through the efforts and interest of W. W. Ashe (1872-1932), North Carolina and the neighboring states of South Carolina and Tennessee have had more species of *Robinia* proposed from within their borders than any comparable area.

The differences noted are often indeed striking but most of the proposed species seem to be but extremes often connected by one or more intermediates to another extreme. Many of the "species" are known from but one original collection and have not been collected again. It is not suggested that the "species" blend gradually into one another but that they represent vegetatively propagated clones often of considerable size and morphological uniformity and with small but rather constant differences from the related "species." Confronted with such an array of variability a "classical" taxonomist usually responds by either "lumping" the variants under few names or attempts to distinguish and name each of the striking morphological variants. Neither procedure is satisfactory but until extensive collecting and transplantation of the plants into experimental gardens is undertaken and the plants carefully studied these "species" or variants will remain a taxonomic muddle. The present treatment is merely then an attempt to provide very tentative and rough guide lines in the existing confusion. Most of the variability centers about *R. hispida* and the features upon which the species have been recognized are 1) leaflet shape, 2) pubescence and especially degree and disposition of the hispid trichomes, 3) shape and length of the calyxlobes, 4) size and habit.

1. Calyxlobes all 2.5 mm long or less, the lower three acute; legume glabrous with a narrowly winged-margin about 1-1.5 mm wide along the seed-bearing (upper suture); petals white . 1. *R. Pseudo-Acacia*.

1. Calyxlobes all or at least the 3 lower lobes longer than 2.5 mm long, the three lowermost acuminate to subulate; legume hispid and the seed-bearing suture either wingless or the wing less than 0.7 mm wide; petals purplish, roseate, pink or rarely white.

2. Bracts caducous but conspicuous in bud and more than 3 mm wide and longer than the mature calyx; branches and peduncles densely glandular with sessile or stout and short-stalked conspicuous glands.

3. Branches and peduncles with sessile or subsessile viscid "clammy" glands 2. *R. viscosa*.

3. Branches and peduncles with stout, short-stalked glands 3. *R. Hartwigii*.

2. Bracts caducous, inconspicuous in bud and less than 2 mm wide and not exceeding the calyx in length; branches and peduncles sparsely to densely puberulent to even densely hispid (but the hispid trichomes slender with at most very inconspicuously swollen, small, glandular tips.)
4. Woody growth of previous season hispid with indurate trichomes 3 mm or more long..... 4. *R. hispida*.
4. Woody growth of previous season lacking indurate trichomes.
5. Peduncles not at all glandular-hispid; branches, peduncles and lower surface of leaflets densely puberulent to villous and more or less canescent when young 5. *R. Elliottii*.
5. Peduncles sparsely to densely glandular-hispid.
6. Shrubs 1 m high or less, found in the Coastal Plain 6. *R. nana*.
6. Shrubs 1 m high or more, found naturally in the Piedmont and mountains.
7. Calyx-lobes ovate or lance-ovate, shorter than the calyx-tube .. 7. *R. Boyntonii*.
7. Calyx-lobes narrow and often caudate, longer than the tube .. 8. *R. Kelseyi*.

1. *ROBINIA PSEUDO-ACACIA* L., Sp. Pl. 722. 1753.

Tree up to about 25 m high (but rarely a shrub) with deeply furrowed, thick bark and somewhat angled to almost terete branches, finely pubescent when young but soon becoming glabrate. Stipules about 1 cm long, linear-subulate, at first membranous and pubescent, usually developing into straight or slightly curved woody spines 0.3-2.5 cm long. Leaves about 2-3 dm long. Leaflets 7-19, elliptic to ovate, mucronate at the broadly rounded apex, acute or more usually obtuse at base, about 2-4(5) cm long and 1-2 cm wide, at first densely puberulent as are the rachis and petiole but all becoming glabrate; borne on petiolules 2-4 mm long and with persisting, setaceous stipels about 1-2 mm long. Racemes about (0.5)1-2 dm long, drooping, puberulent, with numerous, fragrant flowers borne on pedicels about 0.5-1 cm long and each subtended by a minute, caducous bract. Calyx puberulent with short-ciliate margins; the tube campanulate, longer than the lobes, about 4-5 mm high; the upper lip the longest with lobes more or less connate, the free portion broadly triangular and about 1 mm long; the lateral lobes deltoid, about 1-1.5 mm long; the lowermost lanceolate, 1-2 mm long. Petals white (or

very rarely pinkish) but the standard with a pale yellow patch, 1.5-2.3 mm long; standard obovate, emarginate. Legume short-stipitate, about 5-10 cm long and 1-1.2 cm wide, glabrous and with the upper suture narrowly winged, 4-8(16)-seeded.

DISTRIBUTION: Now wide-spread and naturalized throughout much of the eastern United States though perhaps originally native only to the Southern Appalachians.

The BLACK LOCUST is also naturalized along the Pacific Coast and in Europe.

2. *ROBINIA VISCOSA* Vent., Descr. Pl. Cels. 4. 1800.

Shrub or small tree 1.5-4(13) m high with the trunk covered with a dark gray bark and with the branches dark reddish-brown and glandular-viscid with mostly sessile or subsessile glands. Stipules subulate-setaceous, 2-3 mm long, rarely becoming glandular on vigorous shoots. Leaves about 1-2 dm long with minute stipels and with a puberulent, sparingly glandular rachis. Leaflets (11)13-25(27), thick and firm, ovate to ovate-lanceolate to elliptic, acute to rounded and mucronate, about 2-4 cm long and 1-2 cm wide, puberulent to glabrate on both surfaces. Racemes about 5-8 cm long with puberulent as well as glandular-viscid peduncles, rachises and pedicels and 6-15 flowers about 1.8-2.5 cm long. Calyx puberulent, the tube about 4 mm long, the lobes deltoid, acuminate, about 4 mm long. Petals white to pink, the standard with a yellow spot. Legume narrowly oblong, 5-8 cm long, abruptly acute, 6-9-seeded, sparingly glandular-hispid.

DISTRIBUTION: South along the mountains from Pennsylvania to Alabama. The natural range of the CLAMMY LOCUST is probably much more restricted.

3. *ROBINIA HARTWIGII* Koehne, Mitt. Deuts. Dendr. Ges. 22: 1. 1913.

R. viscosa var. *Hartwigii* (Koehne) Ashe, Jour. Elisha Mitch. Sci. Soc. 37: 175. 1922. [as *hardwegii*].

Shrub up to 3 or 4 m high with branches densely puberulent as well as covered with stout, short-stalked glands. Stipules subulate-setaceous, rarely becoming spinose. Leaves 1-1.5 dm long with the densely pubescent rachis bearing scattered, stout, short-stalked glands. Leaflets 13-23, elliptic to lanceolate, mucronate, about 2-3.5 cm long and 1-2 cm

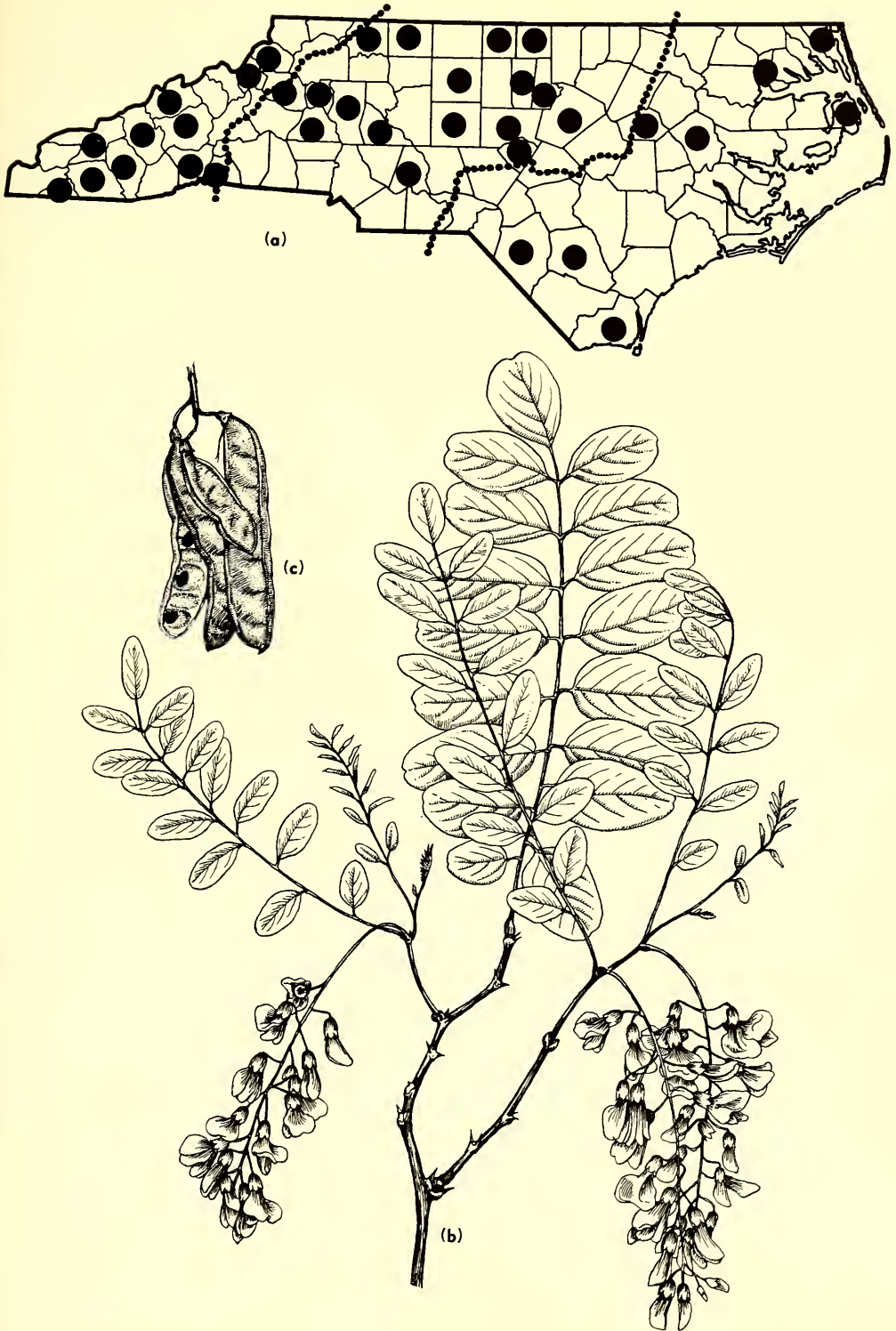


Fig. 103. *Robinia Pseudo-Acacia*. (a) Distribution; (b) Habit sketch; (c) Fruit.

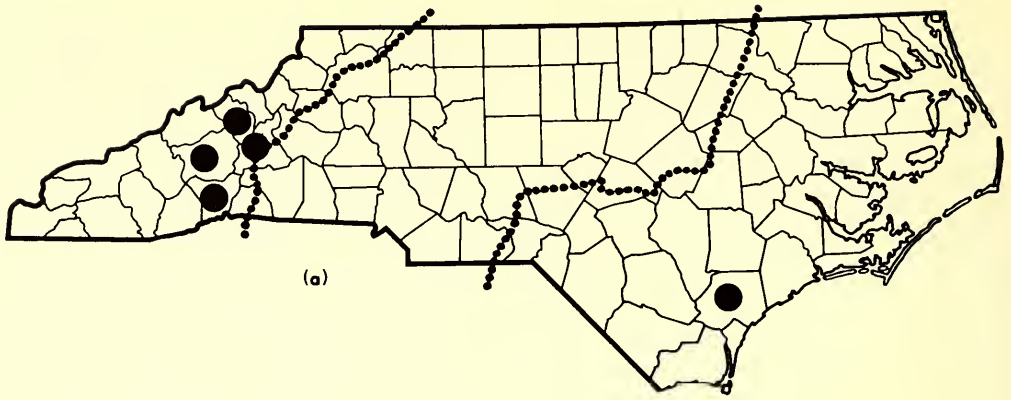


Fig. 104. *Robinia viscosa*. (a) Distribution; (b) Habit sketch.

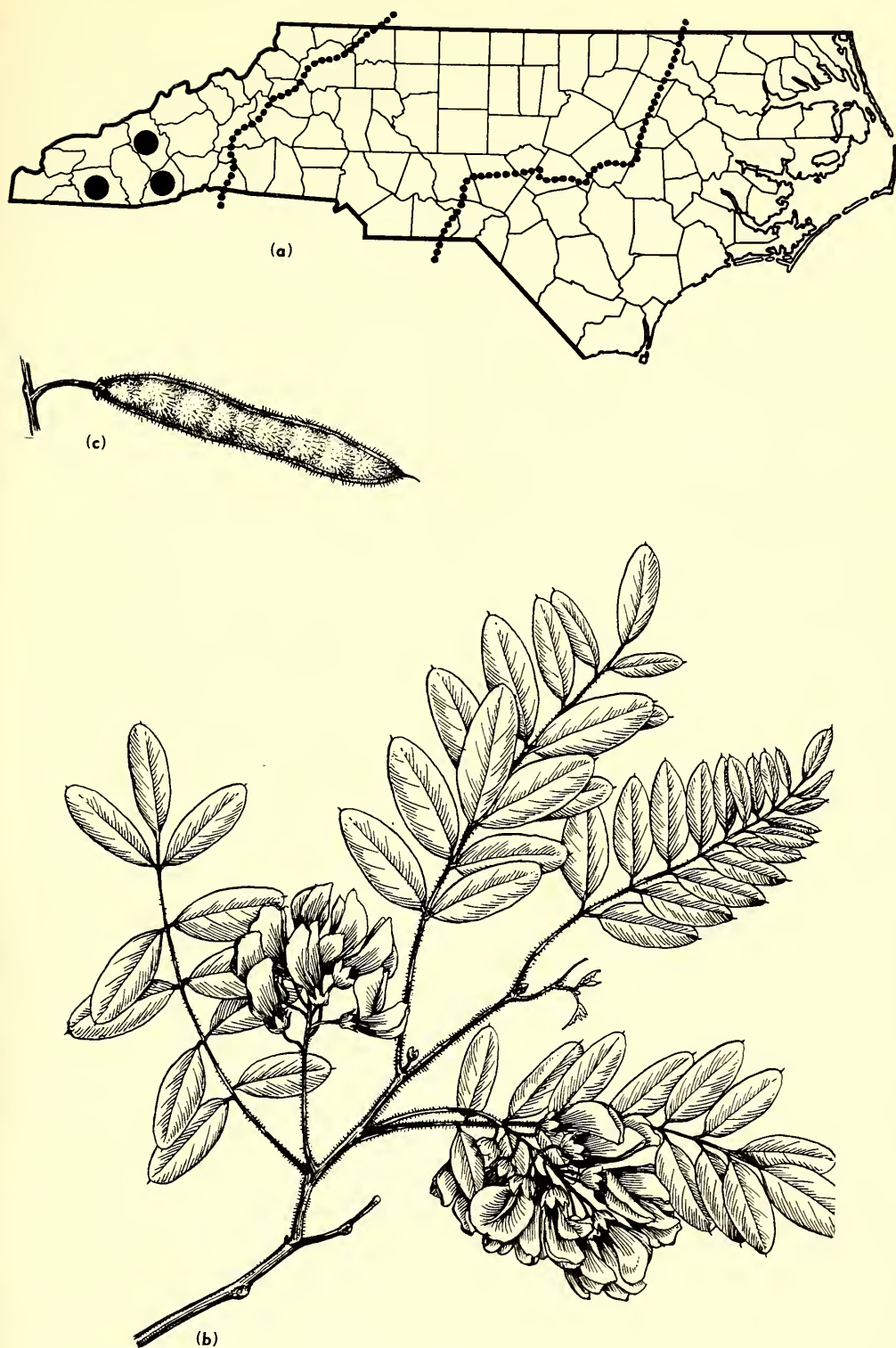


Fig. 105. *Robinia Hartwigii*. (a) Distribution; (b) Habit sketch; (c) Fruit.

wide, loosely long-pubescent to glabrate above, densely villous beneath. Racemes about 5-10 cm long, more or less densely puberulent and glandular throughout, with numerous, closely clustered flowers about 2 cm long. Calyx pubescent and stipitate-glandular, the tube about 4 mm long, the lobes deltoid, acute, about 4 mm long. Petals whitish to more commonly rose-colored. Legume linear-oblong, about 6-10(13) cm long and 12 mm wide, 5-12-seeded, densely and stoutly glandular-hispid.

DISTRIBUTION: Mountains and perhaps the upper Piedmont from North Carolina south to Alabama.

A variable "taxon" and possibly no more than a hybrid assemblage ultimately involving *R. hispida* and *R. viscosa*.

4. ROBINIA HISPIDA L., Mant. 101. 1767.

R. fertilis Ashe, Rhodora 25: 182. 1923.

R. hispida var. *fertilis* (Ashe) Clausen, Gentes Herb. 4: 291. 1940.

Rhizomatose, much-branched shrub (0.3)1-2(3) m high with densely hispid and usually somewhat pilose branches. Stipular spines absent or if present, slender and 3-8 mm long. Leaves about (1)1.5-2.5(3) dm long with a puberulent or short-pubescent and sparingly hispid rachis and subulate-setaceous stipels 2-4 mm long. Leaflets 7-13(19), oblong, ovate- or oblong-elliptic or even suborbicular, about 1.5-5 cm long, and 1-3.5 cm wide, acute or rounded at both ends with mucronulate apex, glabrous or sparsely pubescent on the veins beneath. Racemes about 5-13 cm long with more or less hispid peduncle, rachis and pedicels and 3-5 inodorous flowers about 2-3 cm long. Calyx hispid, the tube about 4-6 mm long, the lobes deltoid-lanceolate, acuminate, 5-7 mm long. Petals purple to reddish-purple. Ovary densely hispid. Legume about 5-8 cm long and 1-1.2 cm wide, densely glandular-hispid, abruptly acuminate, 3-5-seeded.

DISTRIBUTION: The BRISTLY LOCUST occurs in or near the mountains from Virginia to Kentucky south to Georgia and Alabama but is found, perhaps as an escape, throughout a much larger area.

Clausen (1940) presented the following key to distinguish the diploid *R. fertilis* from the triploid *R. hispida* which he considered to be only varietally differentiated.

- A. Leaflets oblong to oblong-elliptical, acute or acutish at apex: plant fruiting freely, attaining a height of 2-3 meters
... *R. hispida* var. *fertilis* (Ashe) Clausen.

- A. Leaflets oblong to suborbicular, obtuse or broadly rounded at apex: plant rarely fruiting, attaining a height of 1-2 meters
..... *R. hispida* var. *hispida*.

The name of this species serves in this very tentative treatment as a repository for many of the "species" proposed by Ashe including *R. longiloba* Ashe (Bull. Charleston Mus. 14: 30. 1918), *R. grandiflora* Ashe (Jour. Elisha Mitch. Sci. Soc. 37: 176. 1922 but not of L., 1753), *R. speciosa* Ashe (Rhodora 25: 181. 1923), *R. pallida* Ashe (Rhodora 25: 182. 1923), *R. fertilis* Ashe (Rhodora 25: 182. 1923) and *R. Unakae* Ashe (Jour. Elisha Mitch. Sci. Soc. 39: 110. 1923). Of these *R. speciosa* with its decidedly villous leaflets would appear to have the most claim for recognition.

5. ROBINIA ELLIOTTII (Chapm.) Ashe ex Small, Fl. SE. U. S. 613. 1903.

R. hispida var. *Elliottii* Chapm., Fl. S. U. S. ed. 1. 94. 1860.

Shrub 0.5-2 m high; branches canescent when young becoming brown and glabrate. Stipular spines, when present, short and stout. Leaves about 1-2 dm long with short-villous rachis and 9-15-foliolate; leaflets oval or elliptic, 1.5-5 cm long and 1-3 cm wide with a rounded base and a rounded to acute, mucronate apex; at first villous-canescens beneath but becoming glabrate, and with stipels 2-3 mm long. Racemes about 5-10 cm long, 5-10-flowered and with villous-canescens peduncles, rachises and pedicels. Calyx villous-canescens and often with a few bristles; the tube about 6 mm long; the lobes deltoid, acuminate, subulate-tipped, about 4-5 mm long. Petals rose-purple to purple; the standard less than 2 cm wide. Legume linear, hispid, 3-5-seeded.

DISTRIBUTION: Coastal Plain and outer Piedmont from North Carolina to Georgia and Alabama.

6. ROBINIA NANA Ell., Bot. S. C. & Ga. 2: 243. 1823.

R. hispida var. *nana* (Ell.) DC., Prodr. 2: 262. 1825.

Rhizomatose shrub with minutely puberulent to almost glabrous, little-branched, ascending stems 2-5(10) dm high. Stipular spines usually lacking but when present short and more or less conic. Leaves about 1-1.5 dm long, 7-11(13)-foliolate. Leaflets elliptic or nearly

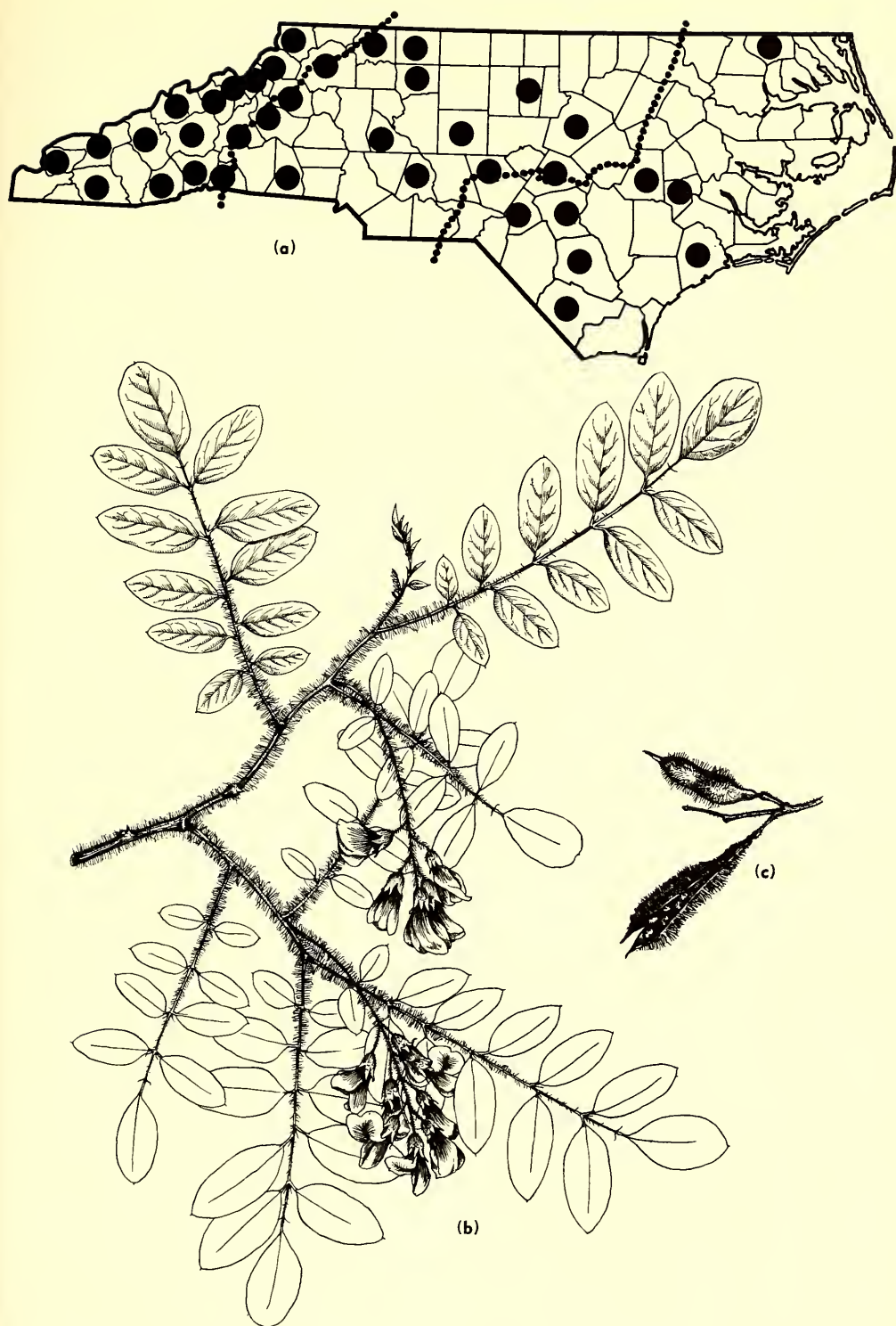


Fig. 106. *Robinia hispida*. (a) Distribution; (b) Habit sketch; (c) Fruit.

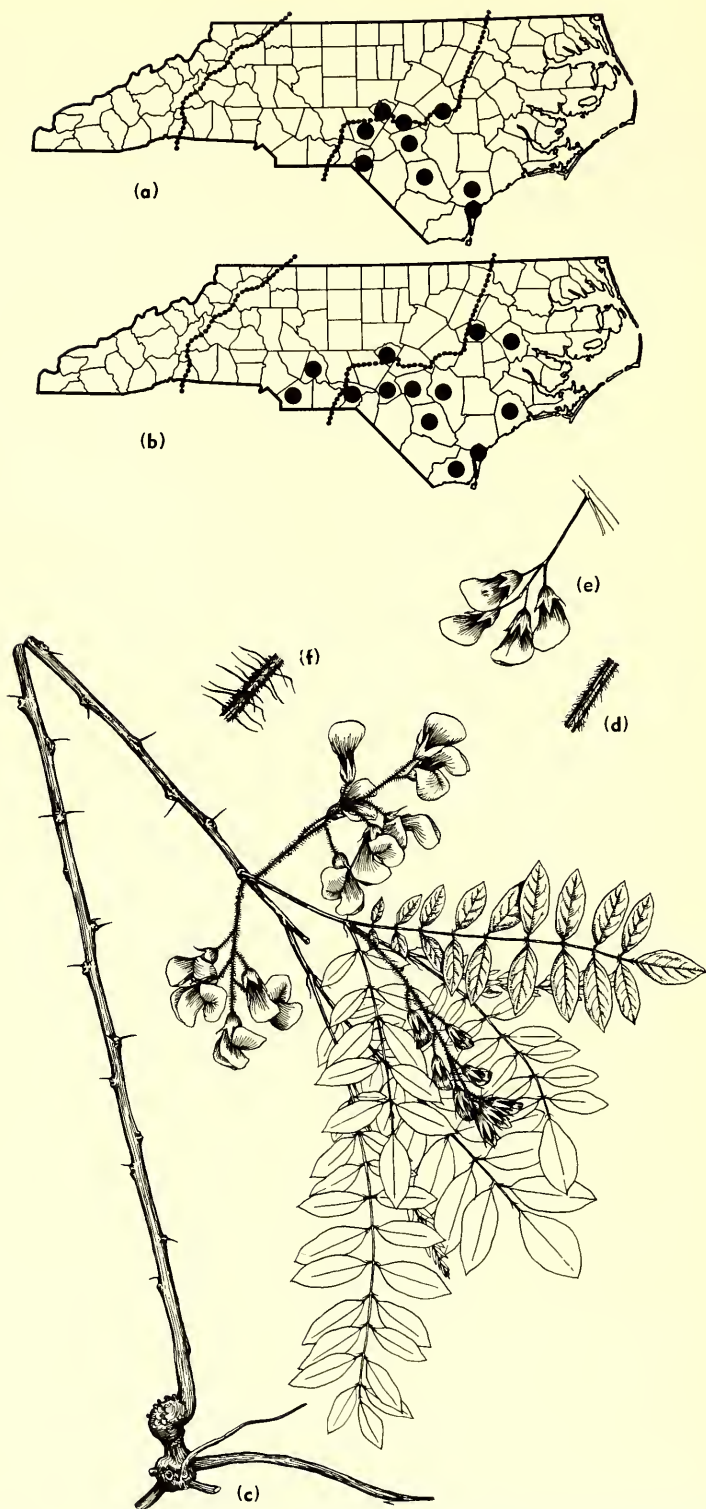


Fig. 107. *Robinia nana* and *R. Elliottii*. (a) Distribution of *R. nana*; (b) Distribution of *R. Elliottii*; (c) Hobit sketch of *R. nana*; (d) Enlarged segment of peduncle of *R. nana*; (e) Flower cluster of *R. Elliottii*; (f) Enlarged segment of peduncle of *R. Elliottii*.

so, with rounded to acutish apex and subtruncate to rounded base, about 3-4 cm long and 1.5-2 cm wide, more or less glabrous. Racemes nodding, rachises and pedicels sparingly glandular, with about 3-5 flowers. Calyx pilose and sparingly hispid, the tube about 5 mm high, the lobes lanceolate, caudate-acuminate, 6-8 mm long. Petals rose-colored, 1.6-1.8 cm long, the standard about 2.5 cm wide.

DISTRIBUTION: The Coastal Plain and outer Piedmont of North and South Carolina.

7. *ROBINIA BOYNTONII* Ashe, Jour. Elisha Mitchell Soc. 14: 52. 1897.

R. hispida var. *rosea* Pursh, Fl. Am. Sept. 2:488. 1814.

Shrub 1.5-2(3) m high with puberulent branches but becoming glabrate, brown and glossy. Stipules subulate, often caducous, but when present, short, about 5 mm long or less. Leaves about 1-1.6 dm long, somewhat puberulent but soon becoming glabrate. Leaflets 9-13, elliptic, oval or oblong-ovate, about 2-4 cm long and 1-2 cm wide, mucronate, with rounded to acute apex, at first minutely puberulent but soon becoming glabrate. Racemes about 7-9 cm long, more or less puberulent and slightly glandular-hispid throughout, with about 8-12 loosely arranged flowers on pedicels about 4-5 mm long. Calyx puberulent and slightly glandular-hispid, the tube 5-6 mm long, the lobes ovate, short-acuminate, about 2-4 mm long and hence shorter than the tube. Petals rose-purple or pink, about 2 cm long. Legume unknown.

DISTRIBUTION: Mountains of North Carolina and Tennessee south to Georgia and Alabama.

8. *ROBINIA KELSEYI* Hutchins., Curt. Bot. Mag. IV. 4 ser. t. 8213. 1908.

Shrub about 1-3 m high with flexuous, glabrous branches. Stipules 2-3 mm long, subulate, spines slender when present. Leaves about 1-1.5 dm long with a glabrous (or nearly so) rachis and 9-13-foliolate. Leaflets narrowly elliptic to lanceolate or oblong-lanceolate, with acute and mucronate apices and obtuse bases, about 2-4 cm long and 8-15 mm wide, slightly pubescent when immature but soon becoming glabrate, with subulate stipels about 2 mm long. Racemes less than 10 cm long with glandular-hirsute rachis and 5-8 flowers borne on glandular-hirsute pedicels about 4-5 mm long. Calyx with few, short-

stalked glands, the tube campanulate and about 4-5 mm long, the lobes deltoid, subulate-tipped, 7-8 mm long. Petals rose-colored, about 15-25 mm long and the standard less than 1.5 cm wide. Pod broadly linear to linear-elliptic, about 4-6 cm long and 1 cm wide, densely glandular-hispid, 3-4-seeded.

DISTRIBUTION: Mountains of North Carolina.

32. *INDIGOFERA* L., Sp. Pl. 751. 1753; Gen. Pl. ed. 5. 333. 1754.

Shrubs or annual or perennial herbs with small, subulate-setaceous stipules and usually odd-pinnately compound (rarely digitate or unifoliolate) leaves with entire, petiolulate, occasionally stipellate leaflets and covered more or less throughout with appressed, 2-branched hairs, apparently attached at their middle (*i.e.* malpighiaceae hairs). Inflorescences axillary or terminal, pedunculate racemes or spikes with usually small, papilionaceous, pedicellate flowers subtended by a minute, caducous bract. Calyx campanulate to tubular, the lobes small, often dentate and equal or the lowermost slightly longer. Petals white, pink, red, purple or yellow; the standard obovate to orbicular, sessile or short-clawed; the wings oblong to oblanceolate and adherent to the laterally pouched or spurred keel-petals. Stamens diadelphous, 9 and 1; the connective extending above the anthers and occasionally appendaged. Ovary sessile or short-stipitate. Legume 1-many seeded, terete or somewhat 4-angled or compressed, globose, oblong or linear, often septate.

A genus of about 350 species principally of the tropics of both hemispheres. (Name derived from the Latin, *Indigo* = indigo and *fero* = bearing).

Small's Manual attributes 3 species to North Carolina. Numerous specimens of *I. caroliniana* have been seen but neither *I. suffruticosa* nor *I. tinctoria* are represented by specimens from North Carolina. These last two mentioned species of *INDIGO* were both introduced into the South and were extensively cultivated in colonial days. Rydberg attributed neither species from further north than South Carolina. Descriptions of the two introduced species are not included and neither species should be considered as part of our flora at present. However, they may be distinguished by the following key:

1. Racemes usually 6-20 cm long, usually longer than the subtending leaves; legume straight, usually 1 cm long or less, usually 2-seeded (varying from 1-3); leaves about equally minutely strigose on both surfaces; petals pinkish to yellowish 1. *I. caroliniana*.

1. Racemes mostly 2-7 cm long, usually shorter than the subtending leaves; legume usually at least somewhat curved, 0.8-3.5 cm long at maturity, 4-12-seeded (rarely only 3-seeded); leaves glabrous to glabrate above at maturity or at least noticeably less strigose above than below; petals reddish, orange or purple.

2. Legume less than 2 cm long, strongly curved, usually 4-7 seeded *2. *I. suffruticosa* Mill.

2. Legume usually 3 cm long or more, only slightly curved, usually 8-12 seeded *3. *I. tinctoria* L.

*Excluded species reported by Small as occurring in North Carolina (1933 p. 698) but not supported by specimens that I have seen.

1. INDIGOFERA CAROLINIANA Mill., Gard. Dict. ed. 8. Indigofera no. 3. 1768.

Widely branching suffruticose herb about 0.5-2 m high with terete, reddish, minutely striate stems. Stipules subulate-setaceous, often deciduous when leaves reach maturity, about 0.8-1.5(2) mm long. Petioles slender, mostly 0.5-1.5(2) cm long. Leaves 9-13(15)-foliolate, about 5-10 cm long with a slender, slightly strigose rachis. Leaflets mostly obovate to oblanceolate, cuneate, broadly rounded and obtuse with mucronulate apex about 0.2 mm long, tapering to the acute base, minutely strigose on both surfaces, mostly 1-2 (2.5) cm long and 5-10 mm wide with petiolules about 1-1.5 mm long. Racemes usually longer than the subtending leaves, about 6-15(20) cm long, slender, loosely flowered and fruited with numerous flowers about 5-6 mm long on strigose pedicels about 1 mm long subtended by a caducous, triangular-subulate bract about 0.8-1 mm long. Calyx densely but finely strigose, the tube shallowly campanulate, about 0.8-1 mm high, lobes triangular, acute, slightly unequal, shorter than the tube, about 0.2-0.4 m long. Petals pinkish to yellowish-brown, the standard about 5-6 mm long, the keel about as long or even a little longer with each petal bearing a conspicuous pouch-like spur, the wings shorter by about 1-2 mm. Legumes more or less oblong, about 5-10 mm long with a stylar beak about 2 mm long and also shortly stipitate, about 3-4 mm wide and about 2-2.5 mm thick, 1-3 seeded but mostly 2-seeded, on elongated fruiting pedicel 2-3 mm long.

DISTRIBUTION: Coastal Plain from North Carolina south into Florida and west into Louisiana.

33. TEPHROSIA Pers., Syn. Pl. 2: 328. 1807. *nom. conserv.*

Cracca L., Sp. Pl. 752. 1753, not Medic, 1787 nor Benth., 1853.

Perennial herbs or shrubs with erect, decumbent or prostrate stems usually arising from a woody crown and with woody roots. Stipules lanceolate to setaceous, persistent or deciduous, usually herbaceous. Leaves odd-pinnately compound, 1-41-foliolate with petiolulate, estipellate leaflets glabrous to pubescent above and always pubescent beneath. Inflorescence terminal, axillary or apparently opposite the leaves, pseudoracemose with papilionaceous flowers fascicled at 1-many nodes with a primary bract at each node and with each of the flower-buds with a secondary bract at the base of the pedicel, these bracts persistent or caducous. Calyx persistent (at least in our species), 5-lobed, the lowest the longest. Petals clawed, the standard more or less orbicular. Stamens monadelphous or diadelphous. Ovary sessile; style glabrous or in all our species bearded on the upper side. Legume sessile, linear, straight or slightly curved, usually compressed, not septate within.

A genus of perhaps 250 species of the tropics and subtropics of both hemispheres. (Name derived from the Greek *Tephros* = ash-colored, referring to the grayish appearance of many species). This treatment is based to an unusual degree upon Wood's (1949) careful revision.

1. Stem stiffly ascending to erect, usually unbranched; inflorescence terminal, never appearing opposite a leaf, very short-peduncled or sessile; roots slender, tough and elongate, not fusiform or cylindrical; stamens monadelphous, the upper stamen cohering to the staminal tube for about ½ its length 1. *T. virginiana*.

1. Stems loosely ascending, decumbent or prostrate, usually branched; inflorescences or at least some of them appearing opposite the leaves, and with elongate, usually conspicuous peduncles; primary root a cylindrical to fusiform taproot; stamens diadelphous, the uppermost stamen completely free from the staminal tube.

2. Rachis of inflorescence conspicuously flattened and 2-3-edged; pubescence of legume 0.5 mm long or less; petioles of the principal leaves usually 1-4-times as long as the lowermost leaflet 2. *T. florida*.

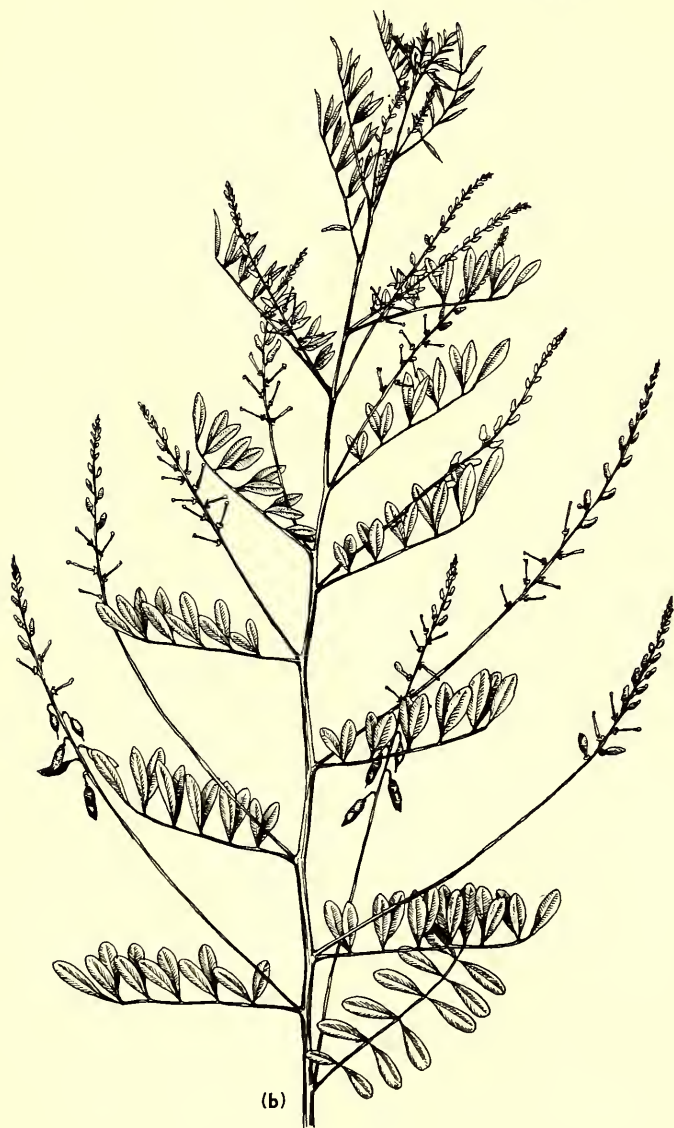
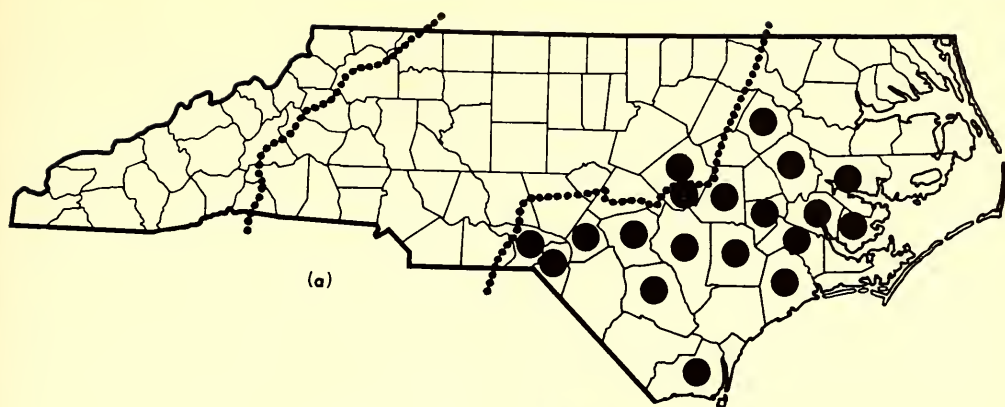


Fig. 108. *Indigofera caroliniana*. (a) Distribution; (b) Habit sketch.

2. Rachis of inflorescence terete or at least neither conspicuously flattened nor 2-edged; pubescence of legume 0.6 mm long or more; petioles of the principal leaves typically shorter than the length of the lowermost leaflet.
3. Inflorescences 0.4-6 dm long with 2-15 (20) floriferous nodes; calyx typically densely pilose to villous with the upper lobes 2.5-5 mm long, the lateral 3-5 mm long and the lowermost lobe 4-6 mm long; stems, rachises and petiolules typically spreading-pilose or villous; apex of leaflets usually obtuse or broadly rounded 3. *T. spicata*.
3. Inflorescence less than 1.5 dm long with 1-3(5) floriferous nodes; calyx usually short-pubescent with the upper lobes 1.5-2.5 mm long, the lateral 1.5-3.5 mm long and the lowermost 2-3.5 mm long; stems, rachises and petiolules mostly with appressed short-pubescence; apex of leaflet usually acute (if obtuse not broadly rounded) 4. *T. hispidula*.

1. *TEPHROSIA VIRGINIANA* (L.) Pers.,
Syn. Pl. 2: 329. 1807.

Cracca virginiana L., Sp. Pl. 2: 752. 1753.
in part.

T. virginiana var. *glabra* Nutt. ex T. & G.,
Fl. N. Am. 1: 296. 1838.

T. virginiana var. *holosericea* (Nutt.) T.
& G., Fl. N. Am. 1: 296. 1838.

Perennial herb from a branched woody crown with long, slender, tough, woody roots and 1-several, erect, nearly terete stems (2)3-7 dm high, unbranched below the inflorescence or occasionally with weak, axillary branches (up to 1.7 dm long), sparsely to densely, appressed to spreading, strigose or short-pubescent to villous almost throughout. Stipules of the lower leaves oblanceolate to linear, those of the upper leaves linear-lanceolate to subulate, 8-11 mm long or less, becoming brown, often deciduous. Petioles mostly 1-6(9) mm long or those of the lowermost leaves sometimes 9-12 mm long, shorter than the length of the lowermost leaflets. Leaves 5-14 cm long, ascending, the principal ones (9)15-25(31)-foliolate, elliptic to linear-oblong, the base and apex rounded to acute, the apex mucronate, 1.1-3.1(3.3) cm long, (2)4-8(10) mm wide, about 2-7-times as long as wide, glabrous or sparingly to densely short-pubescent or even villous above, sparsely to densely appressed or spreading short-pubescent to villous below with petiolules 0.5-1.5 mm long. Inflorescences terminating the main stem

(rarely with axillary branches bearing a few flowers) with 7-20 or more flowering nodes each with 1-3 flowers, either very short-peduncled or the lower 1-6 flowering nodes with leaves, elongating in fruit, the primary and secondary bracts linear-lanceolate to subulate, deciduous, 4-13 mm long and with ascending pedicels 0.4-1.7(2) cm long occasionally bearing 1-3 bractlets. Calyx usually densely pilose or villous; the tube 1.5-2.5 mm long, campanulate; the lobes lance-subulate or narrowly deltoid to ovate or lanceolate, acuminate, 2.5-7.5 mm long, the lowermost longest and the 2 uppermost shortest. Corolla usually bicolorous; the standard lemon-yellow to cream-colored without, cream to white within, about 1.4-2 cm long; the wings rose or rarely white, about 1.5 cm long. Stamens monadelphous, the uppermost stamen coherent to tube for about $\frac{1}{3}$ its length. Legume (2.5)3.5-5.5 cm long, (3.5)4-5.5 mm wide, straw-colored to dark brown, sparsely short-pubescent to villous.

DISTRIBUTION: Most of the eastern United States (and the extreme southern portion of Ontario) from southern New Hampshire to Wisconsin and southeastern Minnesota and south to central peninsular Florida and west to Kansas, Oklahoma and Texas.

The GOAT'S RUE varies considerably in pubescence and several of these differences have been named as varieties. Wood (1949) shows conclusively, however, that there is no geographical segregation of these pubescence types and in fact they are often found growing together; therefore, he concluded varietal rank was unwarranted.

2. *TEPHROSIA FLORIDA* (F. G. Dietr.)
C. E. Wood, Rhodora 51: 305. 1949.

Cracca ambigua (M. A. Curtis) Kuntze,
Rev. Gen. 1: 174. 1891.

Perennial herb from a woody, cylindrical taproot with prostrate to occasionally erect stems up to 6 dm long and more or less sparsely to densely, appressed to spreading short-pubescent throughout. Stipules persistent, those of the lower leaves oblanceolate, acute and up to 11.5 mm long and 2 mm wide, those of the upper leaves progressively smaller, lanceolate to linear, acute to acuminate. Petioles of the principal leaves usually 1-4-times the length of the lowermost leaflets, in erect plants occasionally as short as 0.3 cm but typically much longer and up to

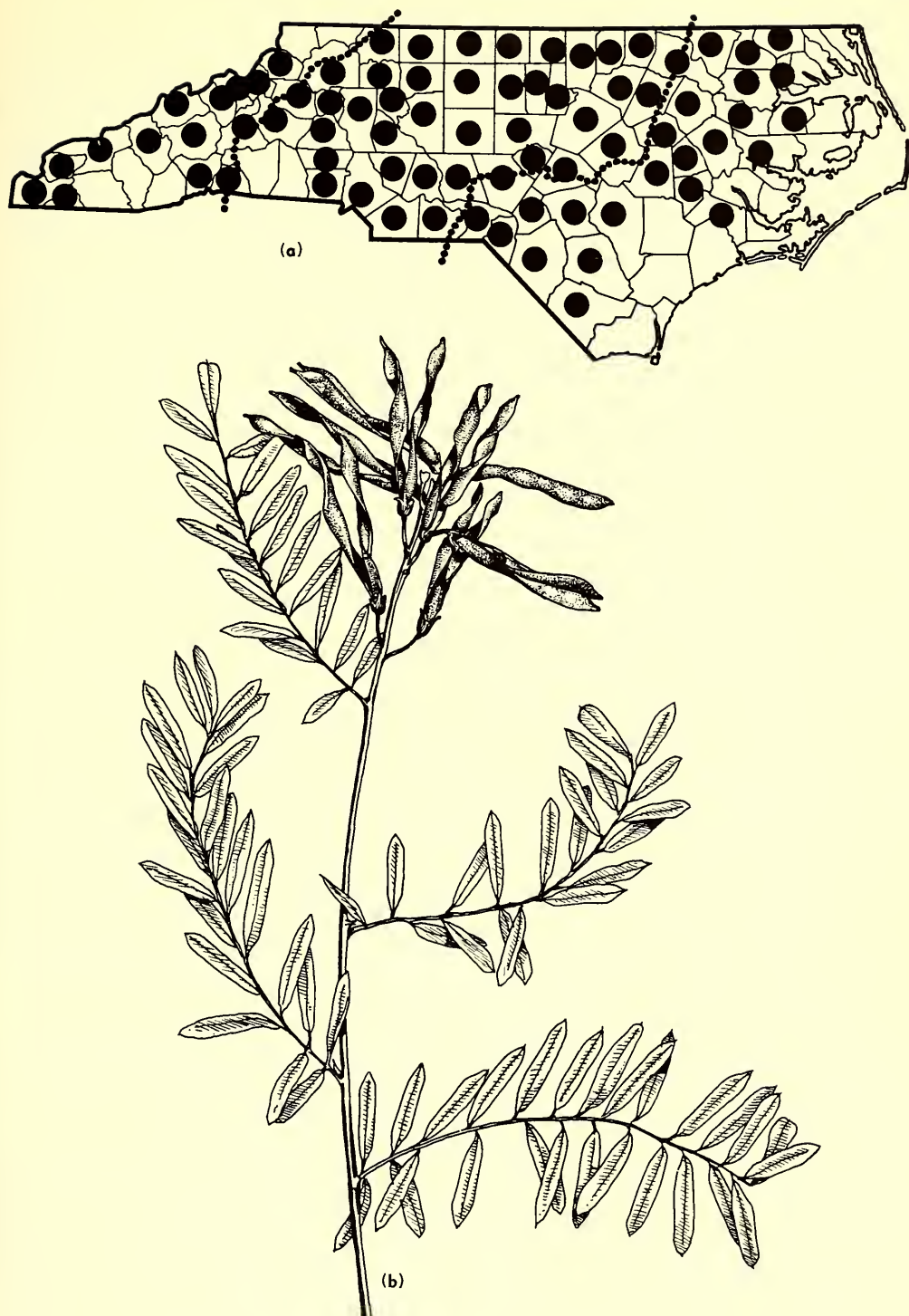


Fig. 109. *Tephrosia virginiana*. (a) Distribution; (b) Habit sketch.

9.5 cm long. Leaves erect or ascending, 3-28 cm long, the principal leaves (7)13(19)-foliolate; leaflets with petiolules about 1-2 mm long, narrowly cuneate to narrowly cuneate-oblong or narrowly to broadly elliptic with obtuse, truncate or retuse apex, mucronate, mostly 1-4(5) cm long and about (2)5-15(18) mm wide, glabrous to moderately short-pubescent above, sparsely to moderately short-pubescent beneath. Principal inflorescences appearing opposite the leaves, the smaller inflorescences axillary or terminal, 3.5-23 cm long, often longer than the leaves, with 1-6(7) floriferous nodes bearing 1-3 flowers and with peduncle or rachis flattened and 2-edged and up to 2-3 mm wide with persistent, narrowly oblanceolate to linear bracts about 3-8 mm long and with ascending pedicels (3)5-12 mm long. Calyx appressed to spreading short-pubescent throughout, the tube campanulate, about 1.5-2 mm high, the lobes deltoid-acuminate to linear-subulate, 1.5-3.5 mm long, the lowermost the longest. Petals at first more or less white, turning pink and then carmine with age and purple upon drying, the standard more or less suborbicular, about 12-16 mm long; the wings auriculate and 11-15 mm long; the keel-petals 10-12 mm long. Stamens diadelphous, the uppermost stamen completely free. Legume 3-4.5(5) cm long and 4-6 mm wide, sparsely to moderately short-pubescent.

DISTRIBUTION: Along the Coastal Plain from North Carolina throughout most of peninsular Florida and westward to eastern Louisiana.

3. *TEPHROSIA SPICATA* (Walt.) T. & G., Fl. N. Am. 1: 296. 1838.

Cracca spicata (Walt.) Kuntze, Rev. Gen. 1: 175. 1891.

T. spicata var. *semitonsa* Fern., Rhodora 42: 456. 1940.

Perennial herb from a woody crown and a cylindrical taproot with 1-many, terete or angled, erect or decumbent stems, mostly 3-6 dm long, more or less sparsely or more commonly densely, appressed but usually wide-spreading pilose throughout. Stipules lanceolate to linear, acute to acuminate, persistent, up to 9 mm long. Petioles 0.1-3 cm long, usually shorter than the length of the lowermost leaflet. Leaves ascending, the principal ones 4-12 cm long and (9)11 (17)-foliolate; the leaflets oblong-obovate to obovate or elliptic to oblong-elliptic, 1.1-2.7 (3.7) cm long and 6-14 mm wide, glabrous to finely pilose above, below somewhat appressed

to spreading short-pubescent to pilose with very obtuse, mucronate apex. Principal inflorescences appearing opposite the leaves or terminal, 4-60 cm long, erect or curving upward, usually longer than the leaves, leafless, with 2-15(20) flower-bearing nodes with about 1-3 flowers/node and a stout, terete or angled but at least not conspicuously flattened rachis, and peduncle bearing numerous primary and secondary, lanceolate to linear, acute to acuminate, persistent, conspicuous bracts 5-13 mm long or less and with stout, ascending pedicels 1-6(8) mm long. Calyx sparsely or more commonly densely pilose to villous with cinerous to rusty hairs; the tube somewhat turbinate, about 2 mm long; the lobes usually deltoid to lanceolate, long-acuminate, the upper and lateral 2.5-5 mm long, the lowermost 4-6 mm. Petals white, becoming pink and then carmine with age and purple upon drying, about 1.2-1.7 cm long. Stamens diadelphous, the uppermost stamen completely free. Legume 3-5 cm long, 4.5-6.5 mm wide, pubescence varying from almost glabrous except along the upper suture to densely pilose or hirsute.

DISTRIBUTION: From southern Delaware and southeastern Virginia and widely distributed throughout much of North and South Carolina, Georgia, Alabama and Florida, west into Louisiana and in eastern Tennessee and Kentucky.

Fernald recognized as a distinct variety those plants which have few or no long villi upon their stems and leaflets glabrous or nearly so above. These more glabrescent plants have been called var. *semitonsa* but, as pointed out by Wood, they are only the extreme of a continuous tendency and are not deserving of formal recognition.

4. *TEPHROSIA HISPIDULA* (Michx.) Pers., Syn. Pl. 2: 329. 1807.

Cracca hispidula (Michx.) Kuntze, Rev. Gen. 1: 175. 1891.

Perennial herb from a woody, fusiform taproot up to 3 dm long and 1 cm thick with erect or decumbent stems up to 5 dm high and more or less appressed to spreading short-pubescent or even short-pilose throughout. Stipules linear-acuminate to linear-setaceous, up to 5-8 mm long, persistent. Petioles usually short, mostly less than 1 cm long although rarely up to 2 cm long, shorter than the length of the lowermost leaflet. Leaves ascending, (3)5-10(11) cm

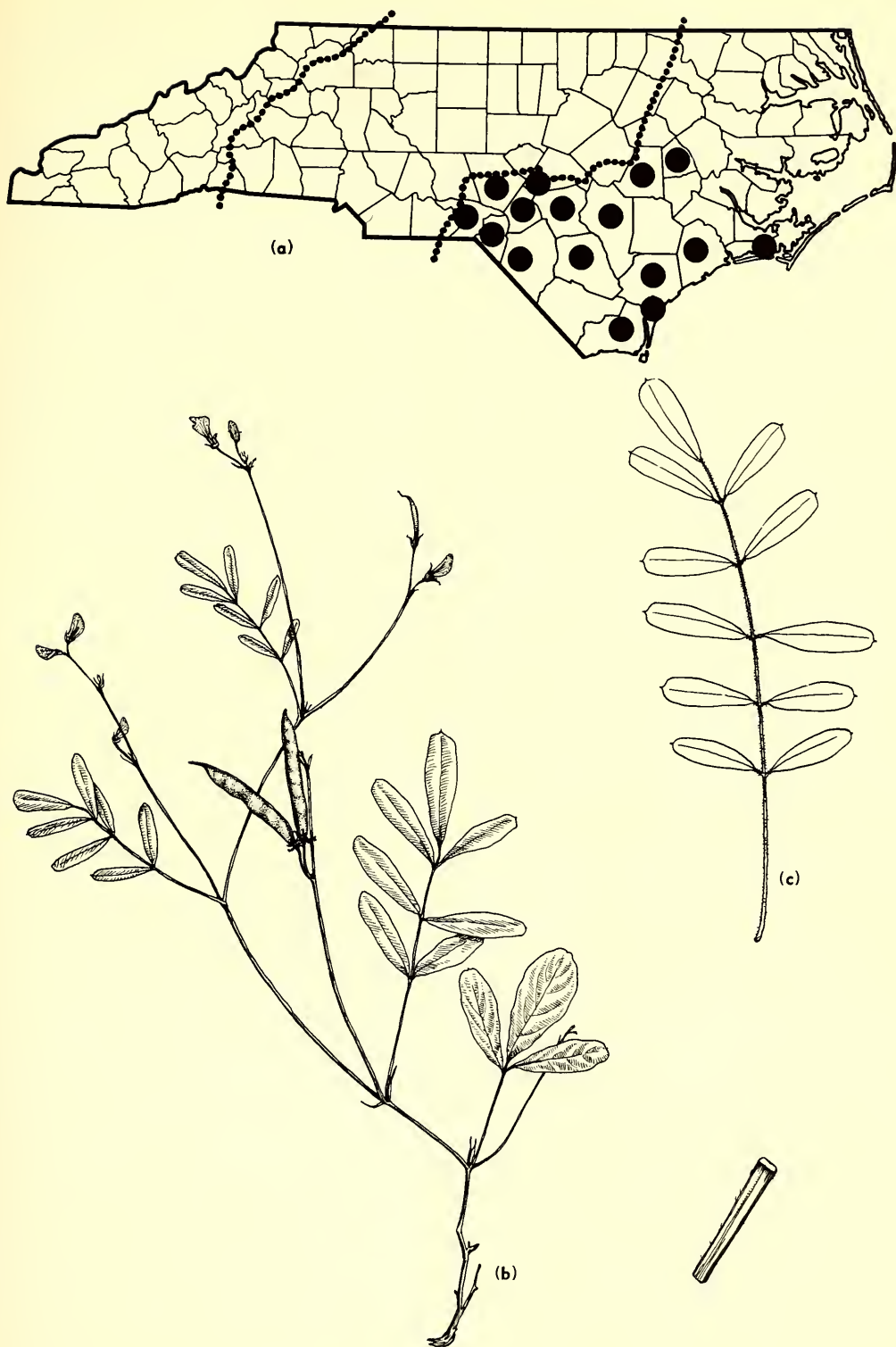


Fig. 110. *Tephrosia florida*. (a) Distribution; (b) Habit sketch; (c) Leaf; (d) Enlarged section of peduncle.

long, the principal ones (9)13-19(23)-foliolate; leaflets oblong to ovate-lanceolate to narrowly elliptic (rarely elliptic or ovate) mostly 2-3-times as long as broad, mostly 7-22 mm long and 2-7 mm wide, usually with an acute or somewhat obtuse (but never broadly rounded) mucronate apex and a broadly rounded to obtuse base, glabrous to densely short-pubescent above, sparsely to densely so beneath, with petiolules 1 mm long or less. Inflorescence opposite the leaves, (1.5)2.5-15 cm long, erect or ascending, slender, usually longer than the leaves, naked or sometimes bearing a single leaf with 1-3(5) flowering nodes with inconspicuously flattened peduncle or rachis about 1 mm wide and with persistent narrowly lanceolate to linear-lanceolate primary bracts about 5-7(9) mm long and with ascending, slender pedicels about 2-8 mm long. Calyx appressed to somewhat spreading, short-pubescent; the tube about 1.5-2 mm long, turbinate; the lobes more or less deltoid, acute to acuminate, 1.5-3(3.5) mm long with the lowermost lobe longest and the uppermost shortest. Petals white but turning to pink and carmine with age and to purple upon drying, about 1.2-1.5 cm long. Stamens diadelphous, the uppermost stamen completely free. Legume 3-4.2 cm long and 4.5-6 mm wide, sparsely to moderately short-pubescent.

DISTRIBUTION: Southeastern Virginia (?); south along the outer Coastal Plain from southeastern North Carolina to central Florida.

34. *ASTRAGALUS* L., Sp. Pl. 755. 1753;
Gen. Pl. ed 5. 335. 1754.

Tium Medic., Vorles, Churph. Phys. Ges.
2: 373. 1787.

Perennial herbs from a taproot, caudex or rhizome or occasionally annuals or shrubs. Leaves usually odd-pinnately compound (occasionally 1-foliolate or palmately 3-foliolate) and typically with numerous leaflets. Inflorescence an axillary raceme with small, persistent bracts subtending the usually short-pedicellate flowers. Calyx-tube campanulate to cylindric with 5 more or less unequal, short, triangular to subulate lobes or teeth. Corolla papilionaceous, the petals violet, purple, white or pale yellow, usually long-clawed; the standard obovate-oblong to rotund, usually exceeding the basally auriculate wing-petals and the blunt keel. Stamens diadelphous, 9 and 1, (or rarely monadelphous). Ovary sessile or stalked. Legume flattened or more usually turgid, sessile or distinctly stipitate, with papery, leathery or woody walls and with one or both sutures protruding into the locule,

either slightly or so as to divide the cavity longitudinally into 2 cells.

A genus of perhaps 1500 species chiefly of the north temperate and arctic regions. (The ancient Greek name for some leguminous plant).

1. Stipules 3 mm long or more; both midvein and secondary veins apparent; floral bracts 3 mm long or longer; legumes completely 2-celled, 1-1.5(1.8) cm long; pubescence of leaflets malpighian (*i.e.* the trichome appearing medially attached) 1. *A. canadensis*.

1. Stipules less than 3 mm long; midvein visible but venation otherwise not apparent; floral bracts about 2 mm long or less; legumes 1-celled with a slight protruding dorsal suture, (1.5)2-3 cm long or more; pubescence of leaflets simple with the trichomes basally attached . 2. *A. Michauxii*.

1. *ASTRAGALUS CANADENSIS* L., Sp.
Pl. 757. 1753.

Astragalus carolinianus L., Sp. Pl. 757.
1753.

A. canadensis var. *carolinianus* (L.) M. E.
Jones, Proc. Calif. Acad. Sci. II 5: 647.
1895.

Erect perennial herb about 0.5-1(1.5) m high with stout, terete, glabrous to sparingly strigose stems. Stipules thinly membranous, deltoid to lance-acuminate, basally broadly attached, mostly 3-10 mm long. Petioles about 1-3 cm long. Leaves odd-pinnately compound, spreading to ascending, mostly 1-2 dm long; leaflets about 13-31, oblong to elliptic or somewhat lanceolate, rounded at both ends or somewhat retuse at the apex, apiculate, about 1-3(4) cm long and (3)5-10(15) mm wide, glabrous or rarely strigose above, minutely to densely strigose beneath with 2-branched (*i.e.* malpighian) hairs. Racemes about 5-15 cm long and about 2-3.5 cm thick on peduncles mostly 7-15 cm long with numerous, densely to loosely arranged, spreading or reflexed, flowers about 1.2-1.5 cm long on pedicels about 1 mm long subtended by linear-subulate to narrowly lanceolate and attenuate, persistent bracts about 3-9 mm long. Calyx finely and inconspicuously strigose or occasionally even glabrous; the tube about 4-6 mm long and about 2-2.5 mm broad; the lobes subulate, about 1.5-5.5 mm long. Petals greenish-white to creamy, the standard 1.2-1.5 cm long, obovate to oblanceolate, slightly arching, the wing and keel petals shorter. Legumes numerous, densely clustered, erect, non-stipitate, on pedicel about 2 mm long, ovoid to oblong,

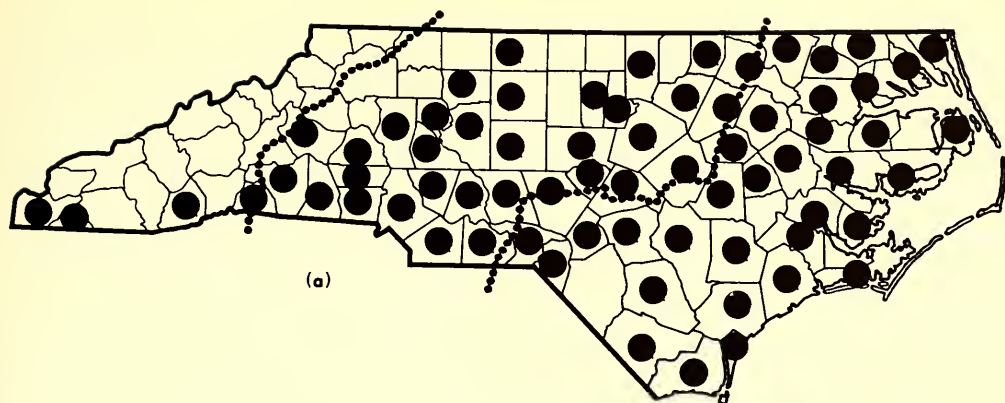


Fig. 111. *Tephrosia spicata*. (a) Distribution; (b) Habit sketch; (c) Leaf; (d) Enlarged section of peduncle.

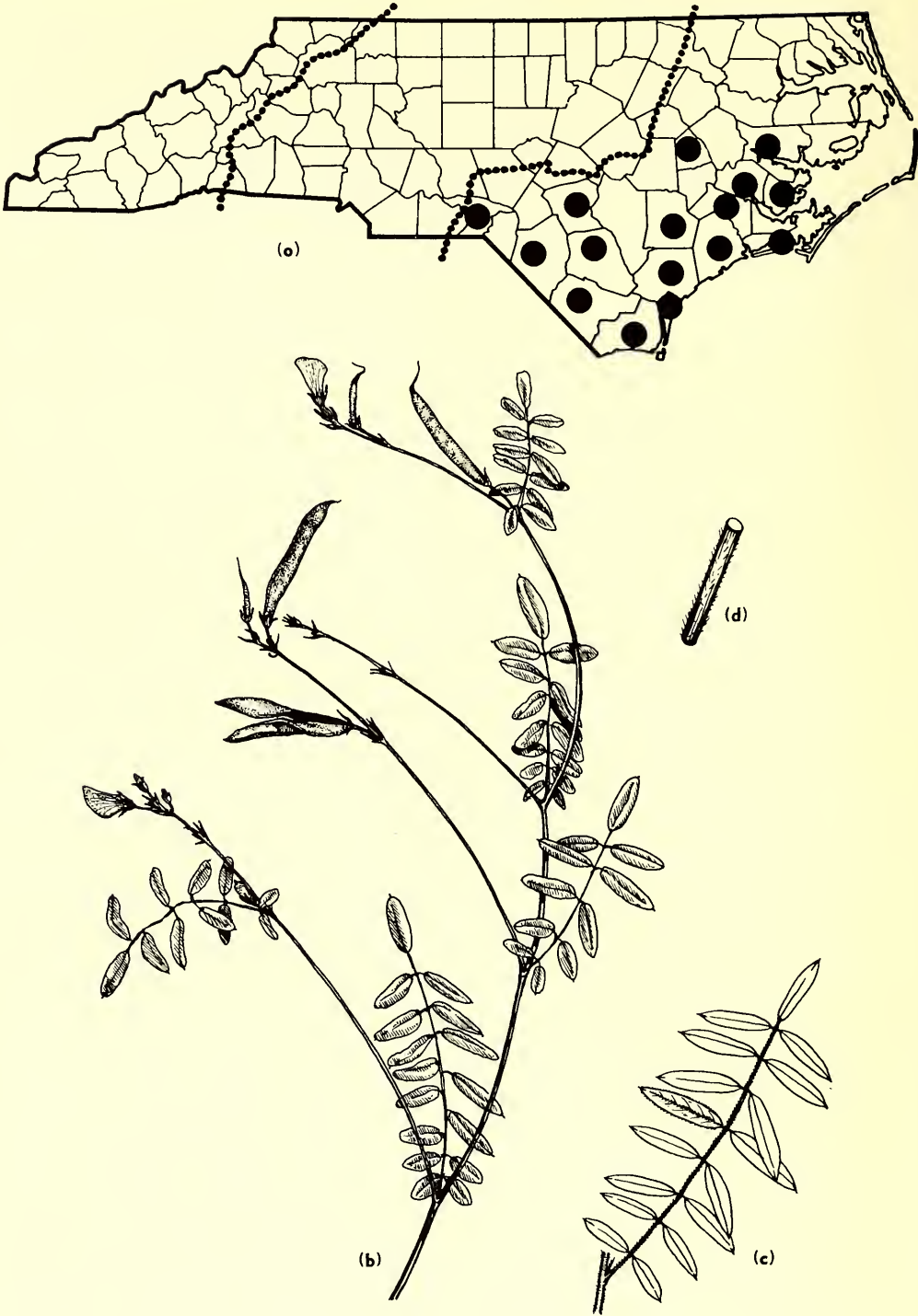


Fig. 112. *Tephrosia hispida*. (a) Distribution; (b) Habit sketch; (c) Leaf; (d) Enlarged section of peduncle.

thick-walled, glabrous, cross-reticulate or rugulose, 1-1.8 cm long, about 5-6 mm thick, more or less terete, completely 2-celled.

DISTRIBUTION: Hudson Bay to British Columbia south to Georgia, Texas, Colorado and Utah.

The representative of this species found in our area apparently has been treated by most recent authors as a variety differing from the more widespread taxon by being smaller and more slender with leaflets relatively more sparsely strigose beneath, a calyx-tube less than 4.5 mm long and calyx-lobes 2-3(3.7) mm long and the longest equaling or at least more than half as long as the tube, and with shorter fruit which are only about 1 cm long and a narrower flowering raceme less than 2.5 cm thick. In contrast the more widespread and robust element is characterized by having leaflets more strigose beneath, a calyx tube exceeding 4.5 mm long and the calyx-lobes 1-3 mm long and less than half as long as the tube and with fruit 1-2 cm long and a flowering raceme more than 2.5 cm thick. It seems impossible without a detailed statistical study to evaluate the characters supposedly differentiating the proposed varieties of this widespread, polymorphic species.

However, even a hurried survey of any large series of specimens of this complex from throughout its entire range will convince one, I believe, that past attempts to indicate the polymorphic nature of this species have not resulted in a very useable treatment. The variation appears to be almost continuous and the varieties recognized certainly are not taxa with anything like discrete geographical ranges. The representatives of this species found for the most part in the southern Appalachians are strikingly different from most of the plants of the New England area. Still most of the characters appear to vary most gradually and it seems at present impossible to objectively delimit the population which has been in the past recognized as *Astragalus canadensis* L. var. *carolinianus* (L.) M. E. Jones or even as *Astragalus carolinianus* L. Fernald (1950, p. 911) has indicated that the range of this variant

was from Maryland and West Virginia south to Georgia and Tennessee. Most, if not all, of the plants from southwestern Virginia are of the short-lobed northern type. Many short-lobed specimens are also present in the North Carolina collections. Further study of the entire complex is obviously in order.

2. *ASTRAGALUS MICHAUXII* (Kuntze)
Hermann, Jour. Wash. Acad. Sci. 38:
237. 1948.

Astragalus glaber Michx., Fl. Bor. Am. 2:
66. 1803, not Lam., 1783.

Tium Michauxii (Kuntze) Rydb., N. Am.
Fl. 24(7): 392. 1929.

Perennial, erect, virgate herb from a woody root with sulcate or above strongly angled stems unbranched below and about 0.5-1 m high, glabrous or nearly so below while more or less densely but inconspicuously appressed to somewhat spreading pubescent above. Stipules deltoid, spreading to reflexed, about 1 mm high. Petioles mostly 0.5-2.5 cm long, mostly much longer than the breadth of the lowermost leaflet. Leaves odd-pinnately compound, spreading, mostly 10-15 cm long; leaflets numerous, 15-25(35), mostly oblong to elliptic, about (0.5)0.8-1.5(2.5) cm long and mostly 2-6 mm wide, obtuse or more commonly retuse at apex, glabrate to pilose on both surfaces, midvein elevated above, venation otherwise not apparent, texture when dry chartaceous, with petiolules about 0.8-1 mm long. Racemes axillary and elongate, about 5-15 cm long on peduncles mostly (5)10-15 cm long with numerous, loosely arranged, wide-spreading to reflexed flowers about 1.2-1.5 cm long attached to a densely pubescent rachis by short-pubescent pedicels about 1-2 mm long subtended by narrowly triangular, persistent, subulate bracts about 1-2 mm long. Calyx densely but inconspicuously strigose to almost glabrate; the tube mostly 4-5 mm long and about 3 mm wide, cylindrical with more or less parallel sides; the lobes deltoid to narrowly triangular-lanceolate, mostly 1-1.5 mm long. Petals white to pale lavender; standard obovate, emarginate, 1.2-1.6 cm long, the wing and keel petals shorter. Legume sessile or very nearly so, slightly curved, glabrous, cross-reticulate, about 1.5-3 cm long, about 4-5 mm in diameter, 1-celled, the partial septum about 1 mm long.

DISTRIBUTION: The Coastal Plain from North Carolina to Florida.

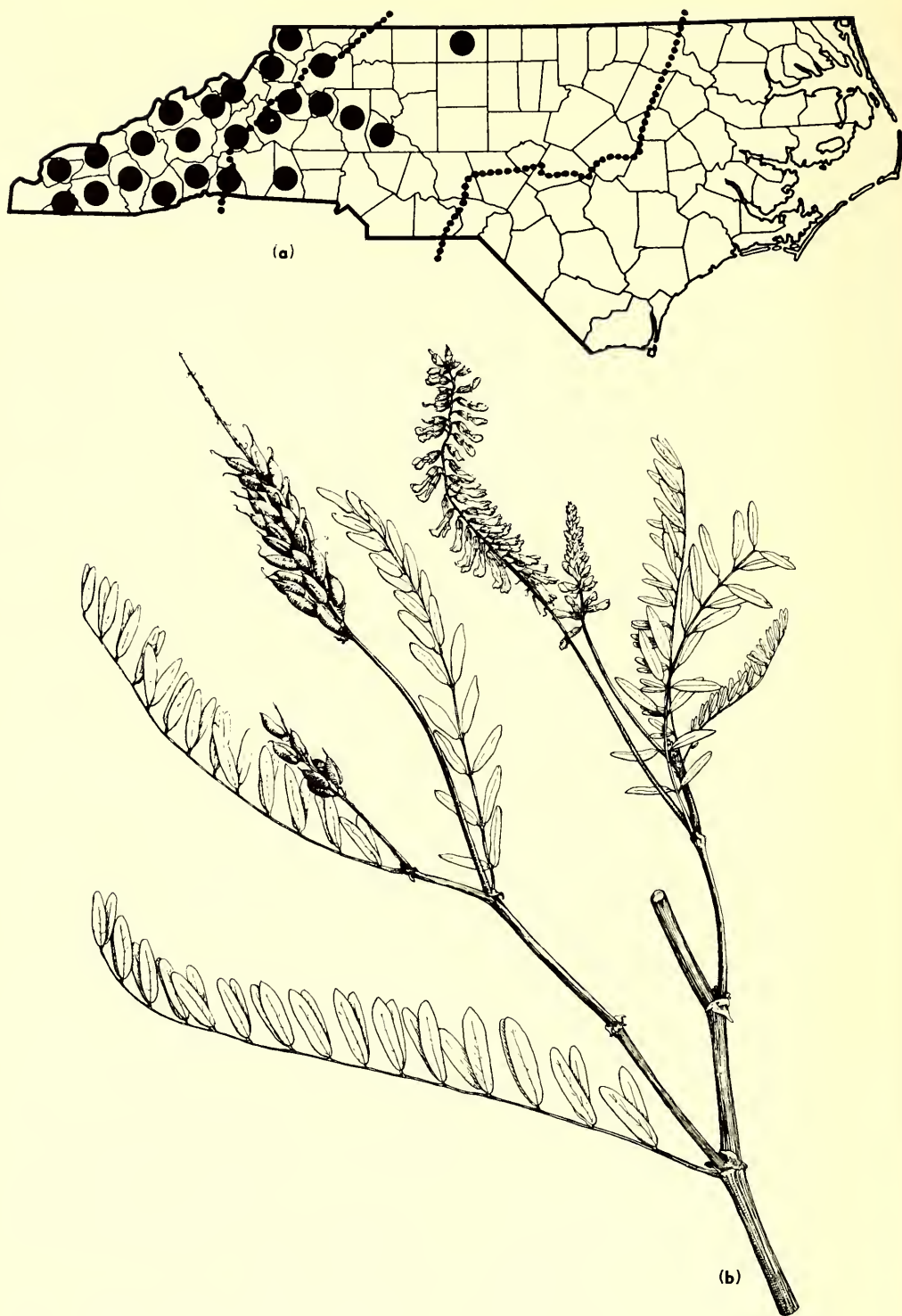


Fig. 113. *Astragalus canadensis*. (a) Distribution; (b) Habit sketch.

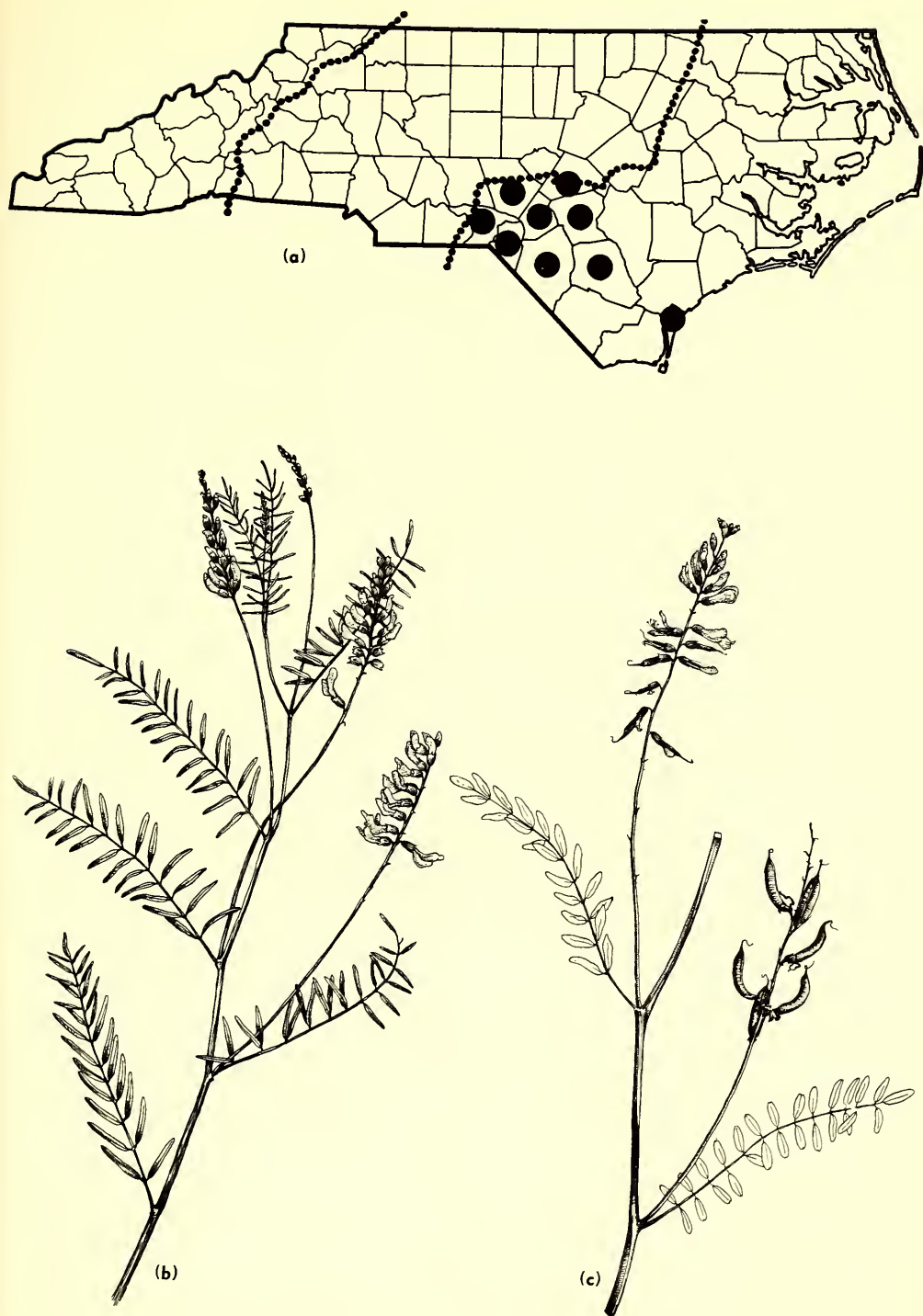


Fig. 114. *Astragalus Michauxii*. (a) Distribution; (b) Habit sketch of flowering cluster; (c) Habit sketch of fruiting cluster.

35. VICIA L., Sp. Pl. 734. 1753; Gen. Pl. ed. 5. 327. 1754.

Annual, biennial or perennial, ascending or climbing, herbaceous vines with stipulate, 1-pinnately compound leaves and with the terminal leaflet either wanting or modified into a simple to much-branched tendril; leaflets entire and petiolulate. Flowers borne in few-flowered, axillary clusters or in short to elongate, axillary racemes with few to numerous, scattered to densely clustered flowers varying in size from about 0.5-3.5 cm long. Calyx campanulate to somewhat turbinate, almost regular to decidedly irregular with 5 lobes or teeth of which the lowest is usually the longest and the upper 2 the shortest. Corolla papilionaceous, purple, violet, blue, white or yellow; the wings adhering to the keel. Stamens diadelphous, 9 and 1, the staminal tube ending obliquely. Ovary sessile or short-stipitate; style slender, terete with a tuft of hairs on lower or outer surface or with a ring of hairs near apex beneath the stigma. Legume usually laterally compressed to almost terete in cross-section, dehiscent, 2-many-seeded.

A genus of about 200 species principally of the northern hemisphere but also found in South America. (The ancient name of these VETCH plants.)

1. Peduncle many times shorter than the leaflets or lacking with 1-2(6) flowers borne in an axillary cluster.
2. Flowers 5-8 mm long, usually solitary; calyx-tube less than 3 mm long; tendrils all unbranched 1. *V. lathyroides*.
2. Flowers 1-3.5 cm long, mostly in clusters of 2-5; calyx-tube 4 mm long or more; tendrils, at least some of them branched.
3. Petals yellow or mostly so, 2-3.5 cm long; the calyx-lobes $\frac{1}{2}$ to $\frac{1}{2}$ as long as the calyx-tube, the tube spreading short-pubescent 2. *V. grandiflora*.
3. Petals reddish-purple (rarely white), 1-3 cm long, calyx-lobes half to nearly as long or even longer than the calyx-tube, the tube sparingly appressed pilose to strigose.
4. Flowers 1.8-3 cm long; corolla purple with violet wings; legume compressed and pale brown at maturity, constricted between the flattened seeds 3. *V. sativa*.
4. Flowers 1-1.8 cm long; corolla uniformly purple; legume terete and blackish at maturity with seeds subglobose 4. *V. angustifolia*.

1. Peduncles distinctive, as long or nearly as long as the leaflets, and with 1-numerous flowers.
5. Flowers in clusters of 1-7(8); the standard 8 mm long or less.
6. Calyx-lobes nearly equal, equaling or longer than the tube; petals about 3-4 mm long; legume pubescent, about 6-10 mm long; typically 2-seeded 5. *V. hirsuta*.
6. Calyx-lobes very unequal, the lower equaling or a little shorter than the tube, the upper minute, much shorter than the calyx-tube; petals 5-8 mm long; legume glabrous, 1-1.5 cm long, typically 4-5-seeded 6. *V. tetrasperma*.
5. Flowers typically in clusters of 8-40 or more; the standard 8 mm long or longer.
7. Racemes loosely flowered; corolla white except for the blue-tipped keel; calyx-lobes triangular, about as broad as long, almost equal and the longest 1 mm long or less 7. *V. caroliniana*.
7. Racemes densely flowered; corolla typically blue to violet (rarely white); calyx-lobes, or at least the lower ones, subulate or attenuate and much longer than broad, very unequal and the longest 1-5 mm long.
8. Calyx-tube rounded but not strikingly gibbose at base, the pedicel thus appearing basally attached; blade of the standard as long as the claw; flowers less than 4-times as long as broad .. 8. *V. Cracca*.
8. Calyx-tube decidedly gibbose or swollen at base, the pedicel appearing laterally attached; blade of the standard less than $\frac{1}{2}$ as long as the claw; flowers 5-times or more as long as broad.
9. Plant densely spreading-villous; the calyx-lobes villous, the lowest and longest lobe long-attenuate and 2-5 mm long, the lateral lobes 2.5 mm long or longer 9. *V. villosa*.
9. Plant appressed-pubescent to nearly glabrous; the calyx short-pubescent to glabrous, the lowest and longest lobe linear-subulate, 1-2 mm long, the lateral lobes 2.2 mm long or less 10. *V. dasycarpa*.

1. VICIA LATHYROIDES L., Sp. Pl. 736. 1753.

Annual or frequent winter-annual with weakly developed root-system and with decumbent to ascendent slender stems branching only at base, about 0.5-1.5(2.5) dm high,

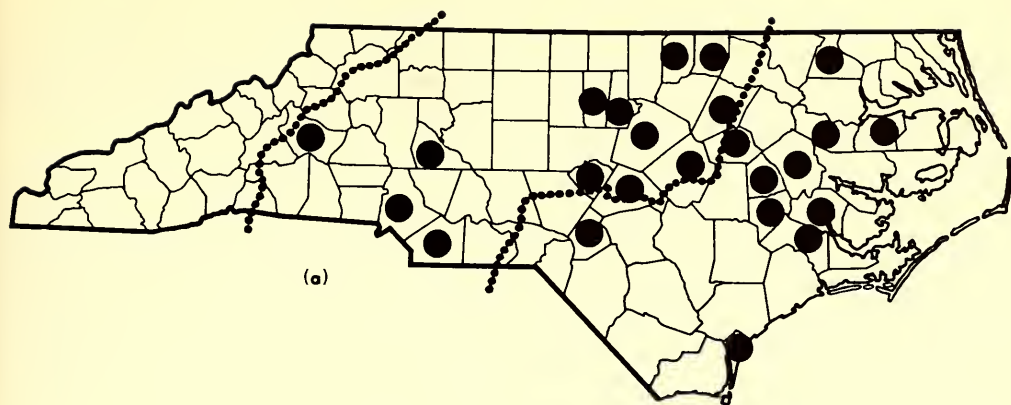


Fig. 115. *Vicia grandiflora*. (a) Distribution; (b) Habit sketch.

softly short-pubescent to glabrous. Stipules small, about 2-3 mm long, half-sagittate, entire, without prominent gland. Leaves with a simple tendril and 2-3(4) pair of glabrous or short-pubescent leaflets, those of the lower leaves obovate to obcordate, about 2-6 mm long and 1-3 mm wide, those of the upper leaves elliptic to linear or oblong, about 0.8-1.4 cm long, truncate to acute or even acuminate, mucronulate. Flowers solitary or more rarely paired in the upper axils, sessile or nearly so. Calyx somewhat turbinate or obconic, more or less pubescent, the tube about 2 mm long, the lobes lance-subulate, nearly equal, about 1.5-2 mm long. Petals usually light violet or blue changing to white; the standard obovate, about 5-8 mm long, scarcely longer than the bluish wings and about twice as long as the obtuse, violet-tipped, greenish keel. Legume ascendent, linear, about 1.5-3 cm long and 3-4 mm wide, beaked, somewhat inflated, glabrous or nearly so, 6-7-seeded, brown to blackish. Seeds verrucose.

DISTRIBUTION: Native of Eurasia and Africa; sporadically introduced along the Atlantic Coast from at least Massachusetts to North Carolina.

2. *VICIA GRANDIFLORA* Scop., Fl. Carn. ed. 2: 2: 65. 1772.

Annual or winter-annual with stems 3-6 dm long, ascending, branching almost from the ground, terete but strongly ridged, glabrous to very finely pubescent. Stipules small, the uppermost ovoid, entire, about 2-3 mm long, the lower ones half-sagittate to somewhat hastate, somewhat coarsely toothed, about 3-4 mm long. Leaves with 3-7 pair of thin, rather variable, petiolulate leaflets and a weak, mostly branched tendril. Leaflets of the lower leaves obovate to obcordate, mostly less than 1 cm long and with few lateral nerves; leaflets of the upper leaves oblong to linear, mostly 1-2 cm long and 2-8 mm wide, obtuse, truncate or emarginate, shortly toothed, and with about 12 pairs of straight lateral nerves. Flowers usually in pairs (but varying from 1-4) in the axils of the upper leaves, (2.3) 2.5-3(3.5) cm long on pedicels about 2-8 mm long. Calyx short-pubescent, the tube about 6-10 mm long, the lobes subulate-lanceolate, almost equal, about 3-5 mm long and about $\frac{1}{3}$ to $\frac{2}{3}$ as long as the tube. Petals pale yellow or yellowish, or with the standard and sometimes the keel suffused with violet, the wings about twice as long as the calyx-tube and longer than the keel. Legume linear, compressed, about 3.5-5 cm long and 6-8 mm wide, at first short-pubescent but at maturity glabrous, black and weakly reticulate.

DISTRIBUTION: Native of southeastern Europe and Asia Minor; introduced into the eastern United States and becoming naturalized.

Shinners (Castanea 21: 151 + 152. 1956) has pointed out that the variant so far encountered in eastern North America differs from Scopoli's description of the plants from southern Europe with ovate to obcordate leaflets but is apparently identical to specimens from central Europe that have been designated var. *Kitaibeli*-ana W. Koch.

3. *VICIA SATIVA* L., Sp. Pl. 736. 1753.

Annual or winter-annual with or without stolons and with a simple or branched stem, somewhat ridged or angular, slender, ascending, erect or tending to climb, up to 1 m high, pubescent but becoming glabrate. Stipules rather small, mostly about (2)3-8(10) mm long, half-sagittate, usually with several conspicuous teeth and bearing a brownish-purple glandular spot. Leaves with a branched tendril and 4-8 pair of oblong, oblong-obovate or elliptic, truncate to emarginate leaflets with mucronate apex and about 1.5-3.5 cm long and 5-15 mm wide, pubescent but becoming glabrate. Flowers mostly borne in pairs in the axils of the upper leaves, usually on pedicels about 2-6 mm long. Calyx-tube campanulate, about 5-7 mm long, the lobes slightly unequal, linear-subulate, the upper and lateral lobes 3-7 mm long, the lower 4-9 mm long with a brownish nectary on the outer surface of the three lowermost. Petals violet-purple or rose, rarely white, the standard 1.8-3 cm long, the wings shorter and usually darker, the keel shorter than both standard and wings. Legume cylindrical to somewhat compressed pubescent at least when young, about (2.5)4-8 cm long and (5)7-8 mm wide, somewhat depressed between the seeds.

DISTRIBUTION: Native of Eurasia; sometimes cultivated and occasionally escaping throughout much of the eastern United States and more frequently encountered on the West Coast.

Gams in Hegi's *Illustrierte Flora von Mittel-Europa* treats *V. angustifolia* as a subspecies of *V. sativa*. The latter taxon may not be established in North Carolina. Most specimens so labeled are *V. angustifolia*. I have seen two specimens that I take to be it from North Carolina but both were probably cultivated.

V. sativa var. *linearis* Lange is distinguished by the leaflets of its upper leaves being linear.

4. *VICIA ANGUSTIFOLIA* L., Amoen.
Acad. 4: 105. 1759.

Annual or winter-annual with or without stolons and with stems 1-4(8) dm long, prostrate, ascendent or erect, more or less climbing, mostly branching only at the base, angular, glabrous or at first short-pubescent and becoming glabrate. Stipules mostly small, about 2-7 mm long, half-sagittate, with several teeth and usually possessing a round or oval, dark purplish or reddish gland. Leaves variable; the lowermost often lacking a tendril, the upper leaves almost always possessing a more or less branched tendril; the lower leaves with about 1-3 pair of small, more or less obovate to obcordate leaflets, the upper leaves with 3-5(6) pair of rather widely spaced, small, narrowly elliptic or linear to lanceolate leaflets mostly 1.5-2(3.5) cm long and (1)2-4(5) mm wide, usually mucronate, truncate or broadly rounded especially below, above often tapering to an almost acute apex. Flowers 1-2 (or more rarely up to 4) in the upper axils on pedicels mostly 2-7 mm long. Calyx glabrous or very nearly so or sparsely short-pubescent along the lobes; the tube campanulate, about 4-6 mm long; the lobes linear-lanceolate, almost equal, 3-6 mm long, with a pale straw-colored nectary on the outer surface of the three lowermost. Standard rose-purple or lilac, about 1-1.8 cm long, longer than the usually more purple wings and whitish keel petals, or occasionally the petals all rose, pinkish or whitish. Legume about 3.5-5 cm long and 4-6 mm wide, almost terete, at first usually short-pubescent but usually becoming glabrate at maturity, dark-brown to black, 8-10-seeded.

DISTRIBUTION: Native of almost all Europe; now widespread throughout the eastern United States and west to the Pacific Coast.

A variant with oblong to oblong-obovate leaflets up to 9 mm wide is also to be found within our area and this has been designated *Vicia angustifolia* var. *segetalis* (Thuill.) Koch.

Another variant with leaflets of the upper leaves narrowly linear and only 1-2 mm wide is sometimes distinguished as *V. angustifolia* var. *uncinata* (Desv.) Rouy.

This taxon has been treated as both a subspecies and a variety of *V. sativa* by various authors, but it is obviously beyond the scope of this account to attempt an evaluation of the worth of the differences.

5. *VICIA HIRSUTA* (L.) S. F. Gray, Nat. Arr. Brit. Pl. 2: 614. 1821.

Annual with decumbent or climbing, slender, much-branched, glabrate to sparsely appressed-pubescent stems mostly 2-7 dm long. Stipules linear-lanceolate to half-sagittate or often in the lower ones with the basal lobe much elongated and drawn out into a filiform segment, the upper often lacking the basal auricle. Leaves mostly 3-8 cm long, sessile, usually with (4)6-8(10) pair of leaflets and a simple or more commonly a much-branched tendril; the leaflets mostly linear or narrowly oblong to narrowly elliptic, about 0.5-1.5(2) cm long, mostly (at least those of the upper leaves) 1-3 mm wide, usually mucronate and truncate or retuse or occasionally acute. Racemes with about (2)3-5(8), more or less secund flowers on pedicels 1-2 mm long on peduncles about 1-3 cm long; the inflorescence usually shorter than the subtending leaf. Calyx finely appressed-pubescent; the tube turbinate, about 0.8-1 mm long; the lobes linear-subulate, almost equal, equaling or more typically longer than the tube, about 1-1.5 mm long. Petals whitish to light blue or the keel even violet-tipped, the standard about (2)3-4 mm long. Legume flattened, about 6-10 mm long and 3-4 mm wide, mostly (1)2(3)-seeded, mostly short-pubescent throughout, usually becoming blackish at maturity, mostly 2-seeded.

DISTRIBUTION: Native of Europe; now widely naturalized throughout much of the United States.

6. *VICIA TETRASPERMA* (L.) Moench, Meth. 148. 1794.

Annual or winter-annual with branching, decumbent or climbing, slender, somewhat angled stems, glabrous (or nearly so) and about (1)2-5 dm long. Stipules half-sagittate, or the uppermost lacking the basal auricle and linear-lanceolate, entire, about 2 mm long. Leaves shorter or but a little longer than the internodes with elongate, mostly simple or more rarely branched tendrils (sometimes lacking on the lower leaves) and with 2-5(8) pair of linear to oblong or oblong-lanceolate to narrowly elliptic leaflets about (0.5)1-2 cm long and 0.5-2(3) mm wide, mucronulate,

acute to more commonly obtuse, glabrous or almost so. Racemes very few-flowered, usually 1 or 2 but rarely 3-5-flowered, on slender peduncles mostly 1-3 cm long. Calyx glabrous to sparingly appressed short-pubescent, the tube turbinate, about 1-1.5 mm high, the lobes unequal, the lower linear-subulate, usually a little shorter to as long as the tube, the upper lobes triangular, much shorter than the tube, about 0.2 mm long. Petals bluish-white to light violet, mostly 4-6(9) mm long. Legume about 1-1.5 cm long and 3-5 mm wide, compressed, glabrous, pale brown, mostly (2)4-5(6)-seeded.

DISTRIBUTION: Native of Eurasia; introduced and widely naturalized from Quebec to Wisconsin south to Texas and Florida.

7. *VICIA CAROLINIANA* Walt., Fl. Car. 182. 1788.

Perennial with slender, quadrate or strongly angled, sparsely short-pubescent to glabrate, trailing or climbing stems about (0.3)0.5-1(1.5) m long. Stipules ovate-oblong to lanceolate, entire, mostly 3-5 mm long. Leaves with simple or branched tendrils and mostly 5-9(12) pair of elliptic to oblong-lanceolate leaflets mostly (0.8)1-2(2.8) cm long and about (2)3-5(8) mm wide with an obtuse or rarely retuse to somewhat acute mucronulate apex and more or less densely puberulent on both surfaces. Racemes axillary, including the peduncle 6-10 cm long or about equaling or shorter than the subtending leaf, with usually 7-20, often secund, loosely arranged flowers about 0.8-1.2 cm long. Calyx densely short-pubescent, scarcely irregular, the tube about 1.8-2.5 mm high, the lobes triangular, acute, almost equal in length, not much longer than broad, mostly 0.5-1 mm long. Petals white with the keel commonly tipped with blue or occasionally the petals suffused with pale blue throughout, the standard about 8-12 mm long. Legume about 1.5-3 cm long, oblong, obliquely long-beaked, compressed, glabrous, 5-8-seeded.

DISTRIBUTION: New York and southern Ontario to Minnesota and south to Texas and Florida.

8. *VICIA CRACCA* L., Sp. Pl. 735. 1753.

Perennial with trailing or climbing, striate, strongly angled, glabrous to densely puberulent stems mostly 0.5-1(2) m long. Stipules small, mostly 2-4 mm long, the lower ones mostly half-sagittate, those above lanceolate to linear, entire, lacking a nectary. Leaves mostly 0.5-1.5 dm long with well-

developed, branching tendrils and (6)8-12(20) pair of linear to narrowly oblong or elliptic leaflets about 1-3 cm long and 3-5 mm wide, mucronate and acute to obtuse at apex and appressed-pubescent to glabrate on both surfaces. Racemes elongate, equaling to nearly twice as long as the subtending leaf, secund, with numerous (mostly 20-50), densely clustered flowers about 8-13 mm long, strongly spreading to reflexed on pedicels about 1 mm long. Calyx nearly regular, more or less appressed short-pubescent throughout, the tube more or less campanulate, scarcely swollen to one side to broadly rounded on the upper side but not conspicuously gibbose and the pedicel appearing basally attached, about 2-3 mm high, the two upper lobes broadly triangular, 0.3-0.7 mm long, the lower lobes broadly triangular, acute, about 0.5-2(2.5) mm long. Petals blue-violet or lilac or seldom white, the blade of the standard equaling or even exceeding the claw in length, about 8-13 mm long. Legume linear-lanceolate, glabrous, 2-3 cm long, 5-7 mm wide; seeds 4-8, globose.

DISTRIBUTION: Native of Europe; naturalized and wide spread in the northern United States and Canada. Hermann (1960, p. 69) states that this species is possibly native to the northern portion of New England and in part of Canada.

This species is included on the basis of one rather poorly developed specimen from Haywood County; otherwise, it is apparently not known from south of Virginia. Numerous specimens formerly identified as this species in the past in our range have proven to be either *V. villosa* or *V. dasycarpa*.

9. *VICIA VILLOSA* Roth, Tent. Fl. Germ. 2(2): 182. 1793.

Annual, biennial or rarely perennial with ascendent stems 0.5-1(2) m high and more or less villous throughout and always so above with pubescence about 1-2 mm long. Stipules mostly 0.5-1.2 cm long, half-sagittate to ovate with a linear to deltoid basal auricle. Leaves with much-branched tendrils and mostly with (5)8-10 pair of narrowly oblong to linear-lanceolate, usually obtuse and mucronate to acute leaflets about 1-3 cm long and 2-6 mm wide and usually spreading-pubescent on both surfaces. Racemes axillary with peduncles commonly 2-7 cm long bearing numerous, usually 10-30(40) densely clustered flowers twisted to one-side (i.e. secund). Calyx irregular, decidedly gibbose at base on the upper side, more or less villous, the tube



Fig. 116. *Vicia caroliniana*. (a) Distribution; (b) Habit sketch.

about 2-4 mm long with a pedicel usually 1-2 mm long and apparently laterally inserted due to the strongly gibbose base; the lobes very unequal, the lateral and lower lobes linear-attenuate or almost filiform above a triangular base, the lowermost about 3-5 mm long, the upper two lobes linear to lanceolate from a triangular base, about 0.8-1.5 mm long. Petals bluish-violet and white, mostly 1.2-1.6 (2) cm long, the spreading blade of the standard less than half as long as the claw. Legume oblong, about 2-3 cm long and 7-10 mm wide, compressed.

DISTRIBUTION: Native of Europe; widely introduced, cultivated and naturalized throughout much of the eastern United States.

10. *VICIA DASYCARPA* Ten., Viagg. Abrezz. 81. 1829.

Annual or biennial (rarely perennial) with slender to thick, striate, ascendent or climbing stems about 0.5-1 mm long, more or less sparsely appressed, short-pubescent to almost glabrate. Stipules half-sagittate to half-halberd-shaped (with the lobe or auricle borne about $\frac{1}{3}$ to $\frac{1}{2}$ way above the middle) or the upper more or less lanceolate. Leaves mostly with 7-10 pair of linear-oblong to narrowly elliptic leaflets about 1.5-3 cm long and 2-6 mm wide, usually obtuse and mucronate to acute, more or less pubescent on both surfaces; the tendril usually much-branched. Racemes secund on peduncles about 2-6 cm long with numerous, (5)10-20, closely associated flowers about 1.2-1.7 cm long. Calyx appressed short-pubescent to glabrate or occasionally partly villous, irregular, the tube decidedly gibbose at base on the upper side, about 2-3.5 mm high, the pedicel appearing laterally attached; the lobes unequal, the lowermost lobe about 1-2 mm long or shorter than the tube, the upper lobes broadly triangular, usually less than 0.5 mm long. Petals mostly violet and white, the standard mostly 1.2-1.7 cm long, longer than the wings, the spreading blade less than half as long as the blade. Legume about 2-4 cm long and 7-10 mm wide.

DISTRIBUTION: Native of Europe; introduced and widely naturalized throughout much of the eastern United States and also along the Pacific Coast.

The *V. Cracca* of Small's Manual apparently included both *V. villosa* and *V. dasycarpa*. Both of the latter species are apparently widespread and abundant through-

out the Southeastern States while *V. Cracca* is apparently very rare in that area. *V. Cracca* may be distinguished from both *V. villosa* and *V. dasycarpa* by 1) its smaller flowers which are less than 4-times as long as broad; 2) by the blade of the standard which is at least as long as the claw; 3) the calyx which is rounded but not gibbose at the base and the pedicels thus appearing basally attached; and 4) by the absence of attenuate tips from the calyx-lobes. The two species usually passing as *V. Cracca* in our area, *V. villosa* and *V. dasycarpa*, differ in possessing 1) flowers 5 or more times as long as broad; 2) a standard-blade less than half as long as the claw; 3) a calyx strongly gibbose at base on the upper side so the pedicel appears laterally attached; and 4) calyx-lobes with an attenuate tip.

36. *PISUM* L., Sp. Pl. 727. 1753; Gen. Pl. ed. 5. 324. 1754.

Annual or perennial herbs with pinnately compound, alternate leaves with 1-3 pair of leaflets and a branched well-developed tendril (rarely reduced to a bristle). Stipules large, foliaceous, often larger than the leaflets. Racemes axillary with 1-3(5), large, pedicellate flowers. Calyx obliquely campanulate, the lobes all large and usually longer than the tube, almost equal but the upper 2 somewhat shorter than both the lateral and lowermost. Corolla papilionaceous, the standard broadly obovate to almost orbicular, the wings adherent to the keel. Stamens diadelphous, the staminal tube abruptly truncate, the upper stamen free or attached near the middle to the others. Ovary almost sessile; style abruptly upwardly bent, strongly flattened, bearded for about the apical third along the inner (i.e. upper) side. Legume compressed to terete, oblong-linear, dehiscent, many-seeded.

A genus of about 6 species of southern Europe and western Asia. (The ancient name of the plant.)

PISUM SATIVUM L., Sp. Pl. 727. 1753.

Annual or winter-annual herbaceous vine with a simple (or branching once at base), decumbent to climbing, weak, strongly angled stem about 0.5-2 m long, glabrous throughout and glaucous to yellow-green in color. Stipules half-heart shaped or somewhat spatulate with conspicuous basal lobe, entire above,

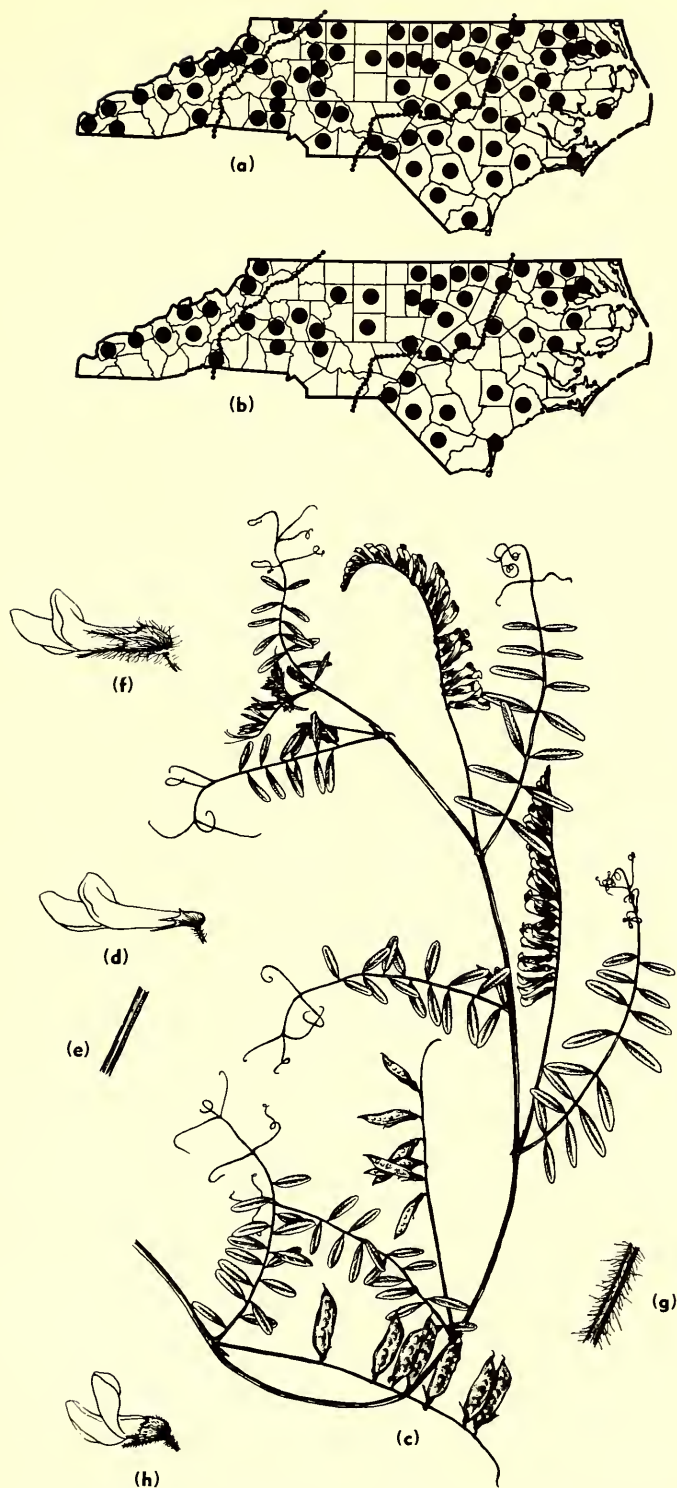


Fig. 117. *Vicia dasycarpa*, *V. villaso* and *V. Cracca*. (a) Distribution of *V. dasycarpa*; (b) Distribution of *V. villaso*; (c) Habit sketch of *V. dasycarpa*; (d) Flower of *V. dasycarpa*; (e) Enlarged section of peduncle of *V. dasycarpa*; (f) Flower of *V. villaso*; (g) Enlargement of peduncle of *V. villaso*; (h) Flower of *V. Cracca*.

toothed on the outer lower edge, about 4-6(10) cm long and 2.5-4 cm wide, usually larger than the leaflets. Leaves glaucous and with a well-developed, much-branched tendril and 1-3 pair of short-petiolulate, oval or oblong to broadly elliptic leaflets about 2-6 cm long and 1.5-3.5 cm wide, usually broadly obtuse and mucronate, entire or distantly toothed. Raceme on peduncles varying from shorter than to 3-times as long as the stipules with 1-3(5) flowers about (1.8)2-2.5(3.6) cm long on pedicels about 0.5-1 cm long. Calyx-tube campanulate, glabrous and glaucous, slightly swollen on the upper side, about 4-5 mm high, the lobes oblong-lanceolate, about 5-10 mm long. Standard broadly obcordate, rose to lilac or white and greenish-veined, about 2-2.5 cm long and 2.5-3.2 cm broad; the wings with dark purplish-violet or whitish blade and a greenish-white claw, about 2-2.2 cm long; the keel rose or greenish-white and about one-third to one-half as long as the wings. Anthers orange. Legume about 3-8(12) cm long and (1)1.2-2(2.4) cm broad, compressed or inflated and more or less terete, tapering to a short point at both ends.

DISTRIBUTION: Native of Eurasia; occasionally spreading from cultivation and sometimes persisting.

Specimens seen in the herbaria from North Carolina are of *P. sativum* var. *arvense* (L.) Poir., the FIELD PEA, grown for forage. It is characterized by smaller flowers with a pinkish standard, purplish wings and a greenish keel and by its smaller fruit and seed. In contrast *P. sativum* var. *sativum*, the ENGLISH PEA, has whitish petals and larger flowers, fruits and seeds. It is probably stretching a point at the present time to include this plant in a listing of the native or naturalized plants of North Carolina. It seems doubtful that these plants would be able to complete their life cycle without man's care.

37. LATHYRUS L., Sp. Pl. 729. 1753; Gen. Pl. ed. 5. 326. 1754.

Annual or perennial herb, the perennials with rhizomes or less commonly with a taproot, with decumbent, ascendent or erect, usually twining or climbing, angled to broadly winged stems. Stipules hastate to obliquely half-sagittately lobed, entire or somewhat toothed. Leaves with the terminal leaflet replaced by a well-developed, often branched tendril, or occasionally reduced to a bristle,

and 1-7(9) pair of petiolulate leaflets (or occasionally leaflets lacking). Racemes axillary with an elongate peduncle shorter than, equaling or sometimes much longer than the subtending leaf and with 1-30 pedicellate flowers subtended by minute, caducous bracts. Calyx decidedly irregular to almost regular; the tube campanulate to somewhat turbinate; the lobes almost equal or the upper 2 shorter, linear, lanceolate, deltoid to ovate, shorter than to longer than the tube. Corolla papilionaceous, violet, blue, purple, red, pink, white or yellow; the standard broadly obovate or obcordate to orbicular, usually differentiated into a distinct and usually reflexed blade and a claw, the wings narrowly to broadly obovate, free from the keel but very closely associated with it by means of the lateral bulge on its inner face which fits into a similar pocket on the keel. Stamens diadelphous, 9 and 1, the staminal tube truncate to very slightly oblique at apex. Ovary sessile or stipitate; the style more or less laterally compressed above and bearded along the inner (upper) side. Legume flattened to almost terete, dehiscent, 2- to many-seeded.

A genus of about 160 species widely distributed in the North Temperate Zone and in South America. (Name derived from the Greek *lathyrus*, the name of some leguminous plant, thought perhaps to be compounded from *la* = very and *thuros* = passionate, in reference to the reputed aphrodisiacal properties.)

- 1. Leaves with a single pair of leaflets.
- 2. Ovary and legume densely hirsute, the hairs with swollen bases 1. *L. hirsutus*.
- 2. Ovary and legume glabrous.
- 3. Flowers 1.2 cm long or less on pedicels 5 mm long or less borne in clusters of 4 or fewer flowers; plants annual; petioles wingless or but very slightly winged; calyx-lobes equal or nearly so; legume less than 5 cm long and 5 mm wide at maturity 2. *L. pusillus*.
- 3. Flowers 1.5 cm long or longer on pedicels 6 mm long or more in clusters of 4-14 flowers; plants perennial; petioles winged; calyx-lobes very unequal, the upper less than 4 mm long, the lateral and lowermost 4-10 mm long; legume 6 cm long or more and 7-10 mm wide 3. *L. latifolius*.
- 1. Leaves with 2 or more pair of leaflets.
- 4. Leaflets (8)10-12(14); stems wingless; racemes usually 10-30-flowered or rarely

fewer and usually exceeded in length by the subtending leaf; the upper calyx-lobes usually less than half the length of the lateral lobes, the lowermost lobe usually slightly shorter than to rarely longer than the tube, about 3.5-4.5 mm long

..... 4. *L. venosus*.

4. Leaflets 4-8(10); stems conspicuously winged to wingless or nearly so; racemes 2-6(9)-flowered and ranging in length from somewhat (about $\frac{2}{3}$) as long to longer than the subtending leaf; the upper calyx-lobes usually half or more as long as the lateral lobes, the lowermost lobe usually not much more than $\frac{1}{2}$ the length of the tube, about 2.5 mm long or less

..... 5. *L. palutris*.

1. LATHYRUS HIRSUTUS L., Sp. Pl. 732. 1753.

Annual or winter-annual more or less glabrous throughout (except for the occasionally sparingly ciliate stipules or calyces) and with numerous branches and often branching from the base and with ascending to erect, climbing stems 0.2-1 m high and with 2 wings 1-2 mm wide. Stipules linear-lanceolate, half-sagittate, about 6-15 mm long or about half as long to as long as the petiole with small basal lobe. Leaves with a 3-times or more branched, sturdy tendril, a winged petiole about (0.5)1-2(3) cm long and a pair of linear-lanceolate to elliptic leaflets about (1.5)3-6(8) cm long and 3-15(20) mm wide with acute to obtuse, mucronate apex, petiolules about 0.5 mm long, and glabrous or nearly so on both sides. Racemes with 1-3(4) flowers on slender, often nodding pedicels most 3-7 mm long subtended by minute, tardily deciduous, acute, narrowly triangular bracts about 0.8-1.5(2) mm long on peduncles about 3-10 cm long and often longer than the subtending leaves and the rachis commonly extending beyond the uppermost flower into a short point. Calyx glabrous to very sparsely ciliate; the tube turbinate, about 2.5-3.5 mm high, the lobes ovate-lanceolate to broadly lanceolate with acute to acuminate apex and about 2.5-4 mm long, nearly equal. Petals blue-violet or rarely red or white, the standard 0.9-1.5 cm long, much longer than the more lightly colored wings or the whitish keel, obcordate, about twice as long as the keel. Ovary densely hirsute. Legume linear-oblong, mostly (2)3-5 cm long and 5-10 mm wide, densely long-hirsute with basally swollen hairs, 4-6(10)-seeded.

DISTRIBUTION: Native of southern Europe, widespread and becoming naturalized from Virginia to Texas; also reported from Oregon.

2. LATHYRUS PUSILLUS Ell., Bot. S. C. & Ga. 2: 223. 1823.

Annual with decumbent or ascending or most commonly climbing, sparsely pubescent to glabrate stems mostly 2-4(7) dm long with numerous branches and narrowly to broadly 2-winged. Stipules half-sagittate, mostly (1)1.5-2.5(3) cm long and equaling or shorter than the slender, wingless or but slightly winged petioles and with lanceolate to lanceolate-ovate, sharp-pointed upper lobe about 2-3-times as long as the acute, triangular basal lobe. Leaves pinnately compound with a well-developed, usually branched tendril and a pair of linear, narrowly lanceolate to narrowly elliptic leaflets about 2-5(7) cm long and mostly 3-7 mm wide with short petiolules about 0.5 mm long. Racemes axillary on slender peduncles about 2-5 cm long with (1)2(3) flowers about (6)8-10(12) mm long on pedicels 1-2(3) mm long with minute, caducous bracts. Calyx glabrous, the tube somewhat turbinate, about 2-2.5 mm long; the lobes linear-lanceolate, about 3-5 mm long, erect, nearly equal. Corolla purple, the standard obovate to elliptic or narrowly obcordate, scarcely delimited into blade and claw, scarcely reflexed. Ovary glabrous. Legume linear, glabrous, (2)3-5 cm long, mostly 3-5 mm wide.

DISTRIBUTION: North Carolina south to Florida and west to Texas and northern Mexico and north to Missouri and south-eastern Kansas.

Hitchcock (1952, p. 4) points out that this native species is but very distantly related to any of our American species and appears more closely related to European species such as *L. hirsutus*.

3. LATHYRUS LATIFOLIUS L., Sp. Pl. 733. 1753.

Perennial herb from rootstock with decumbent, ascending or high-climbing stems about 0.5-2 m high, glabrous and slightly glaucous throughout, and with 2 broad wings 2.5-6(10) mm wide. Stipules varying greatly in size, about (1)3-5(8) cm long, the principal ones foliaceous and 2.5-5(8) cm long, generally entire, half-sagittate, broadly lanceolate, the upper lobe acute to acuminate and 2-3-times as long as the acute to acuminate lower lobe, conspicuously veined. Leaves with broadly winged petiole mostly about 3-9 cm long, with sturdy, much-branched tendrils and a pair of lanceolate, elliptic, or oblong leaflets mostly 4-9(15) cm long and 1.5-3(5) cm wide, about 1.5-5-times as long as wide, obtuse to acute, mucronate, with 5-7 prominent parallel veins



Fig. 118. *Lathyrus hirsutus*. (a) Distribution; (b) Habit sketch.

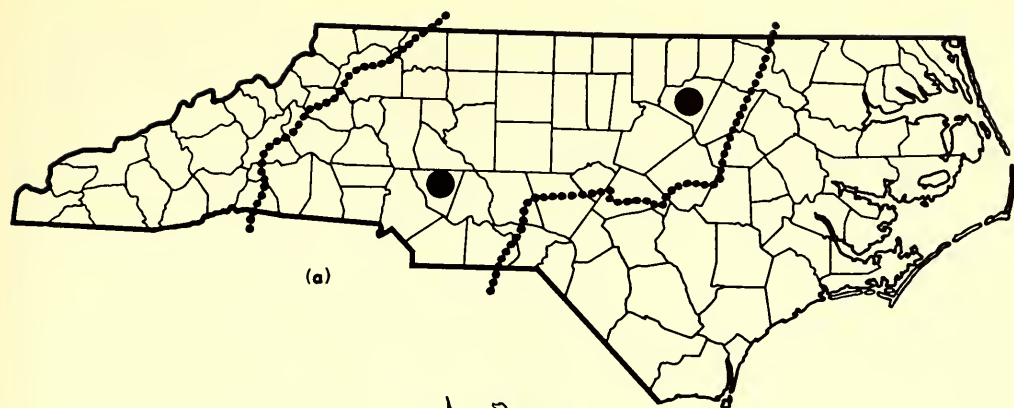


Fig. 119. *Lathyrus pusillus*. (a) Distribution; (b) Habit sketch.

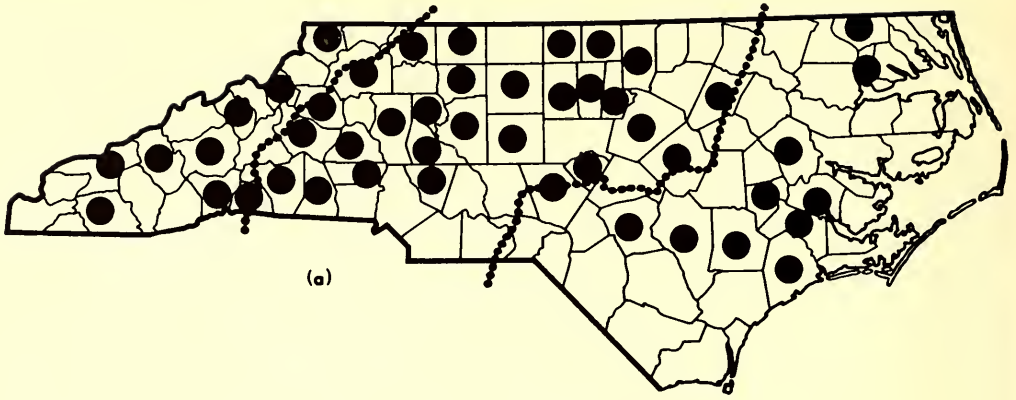


Fig. 120. *Lathyrus latifolius*. (a) Distribution; (b) Habit sketch.

and also conspicuously reticulately veined. Peduncles about 1-2 dm long, much longer than the subtending leaves, bearing a raceme of 4-10(14) large, odorless flowers on pedicels 8-15 mm long subtended by setaceous to linear-subulate bracts mostly shorter than the pedicels and generally 2-6 mm long. Calyx glabrous, the tube campanulate, about 5-6 mm high, the lobes unequal, the upper lobes ovate-lanceolate to ovate-oblong, acute to obtuse, about 2-3.5 mm long, the lateral and upper lobes lanceolate to linear-lanceolate, acute to subulate, about 4-10 mm long. Petals purple or less commonly red, pink or white; the standard strongly reflexed, nearly as broad as long to $\frac{1}{2}$ again as broad, about 1.5-2.5 cm long. Legume glabrous, broadly linear, mostly 6-10 cm long and 7-10 mm wide, reticulately nerved, 10-25-seeded.

DISTRIBUTION: The EVERLASTING PEA is a native of southern Europe but in the United States it escapes from cultivation and persists throughout much of the United States.

4. LATHYRUS VENOSUS Muhl. ex Willd., Sp. Pl. 3(2): 1092. 1802.

Perennial herb from rootstocks with ascending, climbing, stout, striate and lightly angled to 4-angled but unwinged stems about 0.4-1(2) m high, glabrous to densely pubescent. Stipules linear-lanceolate or ovate-lanceolate, half-sagittate, (0.5)1-2.5(3.5) cm long and 1.5-10 mm wide, entire or shallowly toothed. Leaves with well-developed but sometimes unbranched tendrils, a short, unwinged petiole about 1-3 cm long, and (4)5-6(7) pair of narrowly to broadly elliptic or ovate-elliptic, glabrous to short-pubescent leaflets mostly (1.5)3-5(6.5) cm long and 1-3 cm wide, with broadly rounded, mucronate apex and with glabrous to short-pubescent petioles about 0.5-1.5 mm long. Peduncles axillary, stout, usually shorter than the subtending leaf or more rarely equaling it, mostly from about half as long to nearly as long, bearing a raceme of usually 5-20(30), loosely to densely clustered flowers on pedicels about 3-7 mm long subtended by minute (in our specimens less than 0.2 mm long) caducous bracts. Calyx glabrous to densely short-pubescent, the tube campanulate, about 3.5-4.5 mm long; the lobes very unequal, the upper 2 broadly triangular, acute, about 1-1.5 mm long, the lateral lobes lanceolate, about 3-3.5 mm long, the lowermost lobe linear-lanceolate, usually 3.5-4.5 mm long, slightly shorter than to equaling or rarely longer than the tube.

Petals purplish, the standard about (1.2)1.5-2(2.2) cm long, obcordate, the claw nearly equaling the blade. Legume linear-oblong, mostly 4-6 cm long and 5-8 mm wide, glabrous to short-pubescent.

DISTRIBUTION: Native of North America from eastern Quebec to Saskatchewan south to Georgia and eastern Texas.

Butters and St. John (Rhodora 19: 156-159. 1917) proposed three varieties within this species and their treatment was adopted by Fernald (1950). Gleason (1952) and Hitchcock (1952) recognized but two varieties within the "Manual Range"; var. *intonsus* of their treatment also included var. *meridionalis*. From the few specimens available, it is impossible to evaluate these different treatments. Following the treatment proposed by Butters and St. John our few specimens are readily arranged into the two varieties var. *venosus* and var. *meridionalis*. Following either Gleason or Hitchcock the two varieties represented in North Carolina would be var. *venosus* and var. *intonsus*.

1. Calyx glabrous except for ciliate lobes; leaflets glabrous beneath; stipules of the principal leaves ovate-lanceolate, 2-3.5 cm long, 4-10 mm broad *L. venosus* var. *venosus*.

1. Calyx densely short-pubescent throughout; leaflets short-pubescent to glabrate beneath; stipules of the principal leaves linear-lanceolate, the larger 0.8-2 cm long and 1.5-5 mm broad *L. venosus* var. *meridionalis*.

LATHYRUS VENOSUS var. VENOSUS

Range: "W. N. J. to Wisc., s. to Va. and W. Va." Fernald (1950, p. 1935.)

"E. Pa. and adjacent N. J. to e. W. Va. and Ga., chiefly in the mountains, thence w. to Ark. and La." Gleason (1952, 2: 444.)

LATHYRUS VENOSUS var. MERIDIONALIS Butt. & St. John, Rhodora 19: 158. 1917.

Range: "W. Va. to Ark., s. to Ga., La. and e. Tex." Fernald (1950, p. 935.)

The treatment for the varieties of *L. venosus* seems unsatisfactory to me. The calyx of an Orange County specimen was glabrous but the stipules were narrow. Further study is obviously needed.



Fig. 121. *Lathyrus venosus*. (a) Distribution; (b) Habit sketch.

5. *LATHYRUS PALUSTRIS* L., Sp. Pl. 733. 1753.

Perennials from a slender, creeping rootstock with a climbing stem 0.2-1.2 m high and about 0.5-3 mm in diameter, conspicuously winged to wingless, glabrous to sparsely pubescent throughout. Stipules half-sagittately ovate to narrowly lanceolate, about 0.4-2 cm long, sharp-pointed at both ends and usually constricted into 2 lobes, entire or sharply dentate. Leaves with well-developed, branched tendrils and wingless short petioles about 0.5-2 cm long and 2-5 pair of linear, oblong, elliptic-lanceolate, elliptic to ovate leaflets about 2-6(8) cm long and 0.3-1.5(2) cm wide, acute to obtuse and mucronate, glabrous to sparsely pubescent with petiolules about 0.5-1 mm long and finely reticulate venation. Peduncles slender, arching, ranging in length from about $\frac{1}{2}$ as long to equal to or exceeding the subtending leaf with a raceme of 2-6(9) flowers on slender pedicels about 2-5 mm long subtended by inconspicuous, linear-subulate, caducous bracts 0.4-1.2 mm long. Calyx glabrous (in our area) to densely pubescent; the tube campanulate, about 3.5-5 mm long, the lobes unequal, the upper 2 broadly triangular, about 1-1.5 mm long, the lateral lobes lanceolate, acute, about 1.8-2 mm long, the lowermost lobe linear-lanceolate and about 2.2-2.5 mm long. Petals purple to bluish-purple, the standard about 1.5-2.5 cm long with short claw. Legume linear-oblong, about 4-6 cm long and 4-6 mm wide, glabrous, finely reticulate, 5-8-seeded.

DISTRIBUTION: A wide-ranging, circumboreal, polymorphic species of northern Eurasia and North America extending south on the Atlantic Coast as far as North Carolina.

Numerous varieties have been recognized by various authors who seldom are in agreement as to the number or morphologic or geographic boundaries of these subspecific entities. With the few specimens available in the North Carolina herbaria, it is most difficult to evaluate the various diverse treatments or even to determine with certainty the identity of our specimens. Fernald indicates that two of the six varieties recognized in the "Manual Range" also occur in North Carolina. These are separated by him as follows:

Stem relatively stoutish, winged (rarely wingless), excluding the wings 1.5-3 mm in diameter below lowest peduncle; larger leaves with 2-5 pairs of elliptic to lanceo-

late or oblanceolate leaflets 3-8.5 cm long and 0.7-2.3 cm broad; flowers 1.5-2.5 cm long *L. palustris* var. *palustris*.

Stem comparatively slender, wingless or but slightly winged, 0.5-1.5 mm in diameter below lowest peduncle; larger leaves with 2-4 (rarely -5) pairs of ovate, obovate, elliptic or broadly lanceolate leaflets 2-4.5 cm long and 6-17 mm broad; flowers 1-1.8 cm long *L. palustris* var. *myrtifolius*.

LATHYRUS PALUSTRIS var. *PALUSTRIS*.

Eurasia and transcontinental from Alaska to Nova Scotia, south along the Pacific Coast to northern California and extending south in the East to Pennsylvania and to Missouri; adventive in North Carolina.

LATHYRUS PALUSTRIS var. *MYRTIFOLIUS* (Willd.) Gray, *Man. ed.* 2. 104. 1856.

L. myrtifolius Muhl. ex. Willd., Sp. Pl. 3(2): 1091. 1802.

Quebec to Minnesota and south to North Carolina and Missouri.

The few specimens seen by me possess a slightly winged stem with the wings up to 1 mm wide; otherwise these specimens seem to fit the descriptions of *L. palustris* var. *myrtifolius*.

38. *APIOS* Medic., Vorles. Churpf. Phys.-Okon. Gesellsch. 2: 354. 1787.

Perennial, climbing, twining, herbaceous vines arising from slender rhizomes bearing tuberous thickenings with alternate, stipulate, pinnately compound leaves with (3)5-7(9), petiolulate, obscurely and minutely stipellate leaflets. Inflorescence an axillary or rarely terminal, peduncled raceme or with very short, paniculate branches bearing few to numerous, pedicellate flowers subtended by linear to oblong, caducous bracts and with 2 caducous, 1-nerved, minute, linear bractlets. Calyx-tube campanulate to turbinate, the lobes not prominent or strongly developed, the upper two somewhat united, obtuse and ovate, the laterals shortly triangular and acute to nearly obsolete, the lowermost the longest and lanceolate-triangular. Corolla papilionaceous, purple or purplish-brown to red; the standard ovate, obovate, orbicular or cordate to obcordate, very shortly clawed, reflexed, obscurely auricled; the wings shorter than the

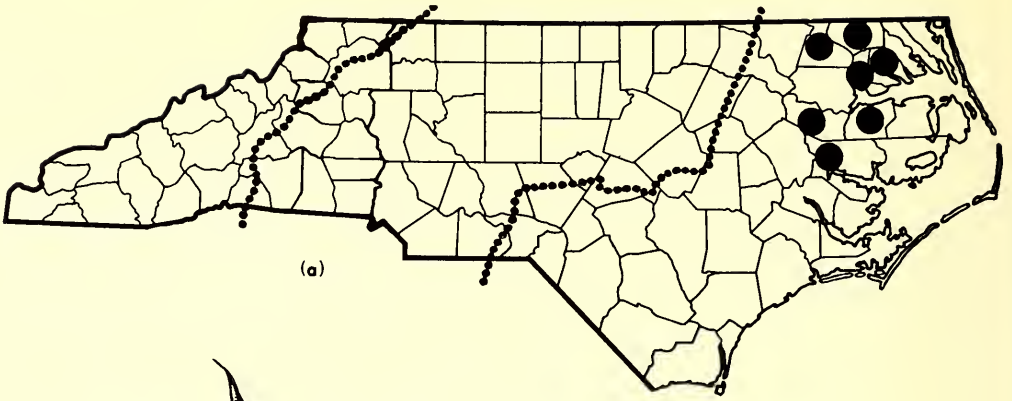


Fig. 122. *Lathyrus polustris*. (a) Distribution; (b) Habit sketch.

standard, at least somewhat auricled and often obovate or linear-oblong with a short claw; the keel-petals short-clawed, strongly incurved and becoming coiled. Stamens diadelphous, 9 and 1. Ovary sessile or nearly so; style slender and strongly curved. Legume linear with several to many seeds and the valves spirally twisting after dehiscence.

A genus of about 8 species with 2 of the species found in eastern United States and the others in eastern Asia. (Name thought to be derived from the Greek *apios* = pear, an allusion to the somewhat pyriform enlargements on the rhizome.)

1. *APIOS AMERICANA* Medic., Vorles. Churpf. Phys.-Okon. Gesellsch. 2: 355. 1787.

Glycine Apios L., Sp. Pl. 753. 1753.

Apios tuberosa Moench., Meth. 165. 1794.

A. americana var. *turrigera* Fern., Rhodora 41: 546. 1939.

Climbing, twining, perennial vine 1-3 m high arising from a rhizome bearing several to numerous fleshy, oblong, oval or globose tubers about 1-2 cm thick in a moniliform series and with short-pubescent to glabrate stems. Stipules setaceous, short-pubescent, soon deciduous, about 4-6 mm long. Leaves pinnately (3)5-7-foliolate, mostly at maturity about 1-2 dm long with petioles mostly 2-7 cm long; leaflets ovate or ovate-lanceolate to lanceolate, about (3)4-6(10) cm long and (1.5)2-3(4.5) cm wide, with acute to acuminate apex and broadly rounded base, glabrous to short-pubescent, with usually densely short-pubescent petiolules (1)1.5-3(4) mm long and setaceous, inconspicuous, deciduous stipels about 1-2 mm long. Racemes axillary, commonly branched, the mature denuded rachis about (3)5-15(20) cm long, with 1 or 2 somewhat fragrant flowers attached to a knobby, much-shortened branch only 1-2 mm long by pedicels about 1-4 mm long and subtended by linear-subulate bracts about 2-2.5 mm long and with 2 linear-subulate bractlets at the top of the petiole; the flowers loosely to densely clustered and the inflorescence varying from rounded to tapered at the tip. Calyx sparsely short-pubescent to glabrate, the tube broadly hemispheric and about 3 mm high; the lobes unequal, the upper lobe more or less united, broadly rounded but each terminating in a short, acute, triangular tooth; the lateral lobes very broadly triangular, acute, about 1 mm high; the lowermost lobe narrowly triangular-subulate to lance-subulate, about 1.5-2 mm long. Petals purplish-brown, the stand-

ard broader than long, rounded or retuse at apex, about 9-13 mm long. Legume linear, about 5-10(12) cm long and 4-6(7) mm wide, straight or slightly curved, with coriaceous valves.

DISTRIBUTION: Nova Scotia and New Brunswick west to Minnesota, South Dakota, and Colorado and south to Texas and Florida.

Fernald's var. *turrigera* is supposedly distinguished from the typical element of the **GROUNDNUT** by its more loosely flowered racemes which were tapered to the tip rather than being broadly rounded. This variant according to Fernald is found locally throughout the southern portion of the species range. Specimens from all three provinces but especially from the Coastal Plain of North Carolina apparently represent this variant but it does not appear worthy of varietal recognition to me. The distinguishing character appears most subjective in application and there certainly is no geographical segregation.

39. *ERYTHRINA* L., Sp. Pl. 706. 1753; Gen. Pl. ed 5. 316. 1754.

Trees, shrubs or perennial herbs often armed with spines or prickles and with alternate, deciduous, pinnately 3-foliolate, stipulate leaves usually crowded toward the tip of branchlets and with often prickly petioles. Leaflets stipellate, petiolulate and the terminal often conspicuously larger than the usually inequilateral lateral leaflets. Flowers axillary and solitary or borne singly or in fascicles of 2-few in leafless, usually unbranched, lateral or terminal, raceme-like clusters with caducous bracts subtending both the fascicles and the pedicels and with smaller caducous bractlets at or near the summit of the pedicel. Calyx gamosepalous, spathe-like or campanulate to tubular, often irregular, entire, toothed or lobed. Corolla papilionaceous, the standard conspicuous, longer than to about equaling the stamens, linear-oblong to subrotund, usually short-clawed, often reflexed, usually reddish; wings (when present) much shorter than the standard; keel-petals separate to dorsally connate, much shorter than to almost equal to the standard. Stamens monadelphous to diadelphous, anthers versatile. Ovary stipitate; the style slender, incurved; the stigma capitate. Legume stipitate, linear-oblong, straight to coiled or twisted, compressed to cylindric, not at all to deeply con-

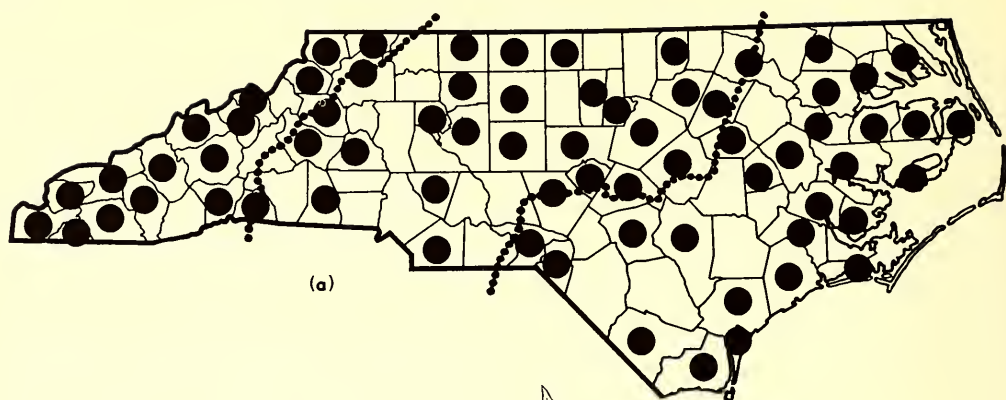


Fig. 123. *Apios americana*. (a) Distribution; (b) Habit sketch.

stricted between the often brightly colored seeds, dehiscent by 1 or both sutures.

A genus of perhaps 100 species of the tropics and warm temperate region of all continents except Europe. (Name from the Greek meaning red in reference to the often bright red flowers.)

1. ERYTHRINA HERBACEA L., Sp. Pl. 706. 1753.

Erythrina arborea (Chapm.) Small, Fl. SE. U. S. 647. 1903.

Perennial herb about 0.6-1.2 m high with a thick fleshy root (or shrub or tree up to 8 m high in the southern part of range) with slender, usually prickly branchlets with pinnately 3-foliolate leaves and petiolules about (2.5)5-10(18) cm long. Leaflets thinly chartaceous, glabrous or nearly so throughout, occasionally prickly beneath, hastately 3-lobed to broadly hastately deltoid, about (2)4-8(12) cm long and (2)3-6(10) cm wide tapering to the rounded, mucronulate apex and attached to the usually prickly rachis by petiolules (1.5)3-5(8) mm long. Racemes terminal, much elongate (in ours on usually leafless stems arising from the crown), (1)2-5(7) dm long, with few to numerous flowers on pedicels about 3-9 mm long subtended by linear-lanceolate, caducous bracts about 1-4 mm long and with 2 linear, caducous bractlets about 1-2 mm long near or at the top of the pedicel. Calyx-tube campanulate, glabrous or nearly so, truncate, about 5-11 mm high. Standard scarlet, narrowly elliptic, 3-5.3 cm long, 0.7-1 cm wide, usually rounded at the apex and with cuneate-clawed base; wings clawed, about 5.5-11 mm long and 1.5-3.5 mm wide; keel-petals acuminate, with clawed base, about 6-13 mm long and 2-4.5 mm wide. Ovary and stipe pubescent. Legumes mostly about 7-15(21) cm long and 1.2-1.6 cm broad, constricted between the several to many, scarlet seeds, with stipe 1.5-4.5 cm long.

DISTRIBUTION: North Carolina south to Florida and west to Texas and into Mexico.

40. CENTROSEMA (DC.) Benth., Ann. Mus. Wien 2: 117. 1839, *nom. conserv.*

Bradburya Raf., Fl. Ludov. 104. 1817. *non* *Bradburia* T. & G., Fl. N. Am. 2: 250. 1842 *nom. conserv.* (Compositae).

Trailing or twining, climbing, herbaceous or suffrutescent, perennial vines with alternate, pinnately compound (but sometimes so nearly

equally stalked as to appear palmate), usually 3-foliolate (more rarely 1-, 5- or 7-foliolate) leaves with persistent, striate stipules and persisting stipels. Flowers often large and conspicuous and borne in axillary clusters or solitary on pedicels subtended by a persistent, striate bract with a pair of appressed, often large and conspicuous, persistent bractlets at base of flower. Calyx-tube campanulate to hemispheric with nearly equal lobes, the upper two sometimes more or less united. Corolla papilionaceous, violet, blue, rose or white; the standard broadly obovate to orbicular, much larger than the other petals, with an often small, median spur near the base; wings oblong to obovate, curved; the keel-petals strongly incurved, very broad, scarcely shorter than the wing-petals. Stamens diadelphous, 9 and 1, or the uppermost somewhat united. Ovary nearly sessile; the style incurved, elongate and glabrous except for the bearded area about the stigma. Legume linear, almost sessile, compressed, bearing a thin, longitudinal, elevated line close to both margins, many-seeded, with an elongate, persistent, beak-like style, the valves longitudinally twisting after dehiscence.

A genus of perhaps 40 species of tropical and warm temperate America. (Name derived from the Greek *centron* = spur and *sema* = standard in reference to the peculiar spurred standard.)

1. CENTROSEMA VIRGINIANUM (L.) Benth., Ann. Mus. Wien 2: 117. 1838.

Bradburya virginiana (L.) Kuntze, Rev. Gen. 164. 1891.

Centrosema virginianum var. *ellipticum* (DC.) Fern., Rhodora 43: 587. 1941.

Trailing or climbing, twining vine 0.5-1(1.5) m long, more or less minutely pubescent throughout. Stipules ovate-lanceolate to lanceolate, striate, persistent, about 1.5-3(4) mm long. Petioles slender, mostly (1.5)2-6(8) cm long. Leaves with petiolules about 1-3 mm long and setaceous, persistent stipels about 1-3 mm long and pinnately 3-foliolate, the rachis-stalk of the terminal leaflet about (0.5)1-1.5(2) cm long; leaflets broadly to narrowly ovate, ovate-lanceolate, oblong to elliptic, obtuse to acute or almost acuminate, usually broadly rounded to almost truncate or more rarely gradually tapering or nearly cordate at base, thin or more typically thick and firm, conspicuously reticulate, mostly (2)3-6(7) cm long and (in our area) (0.7)1.5-2.5(4) cm wide, both surfaces minutely pubescent. Racemes axillary with large, conspicuous flowers with a peduncle mostly 1-3(5) cm

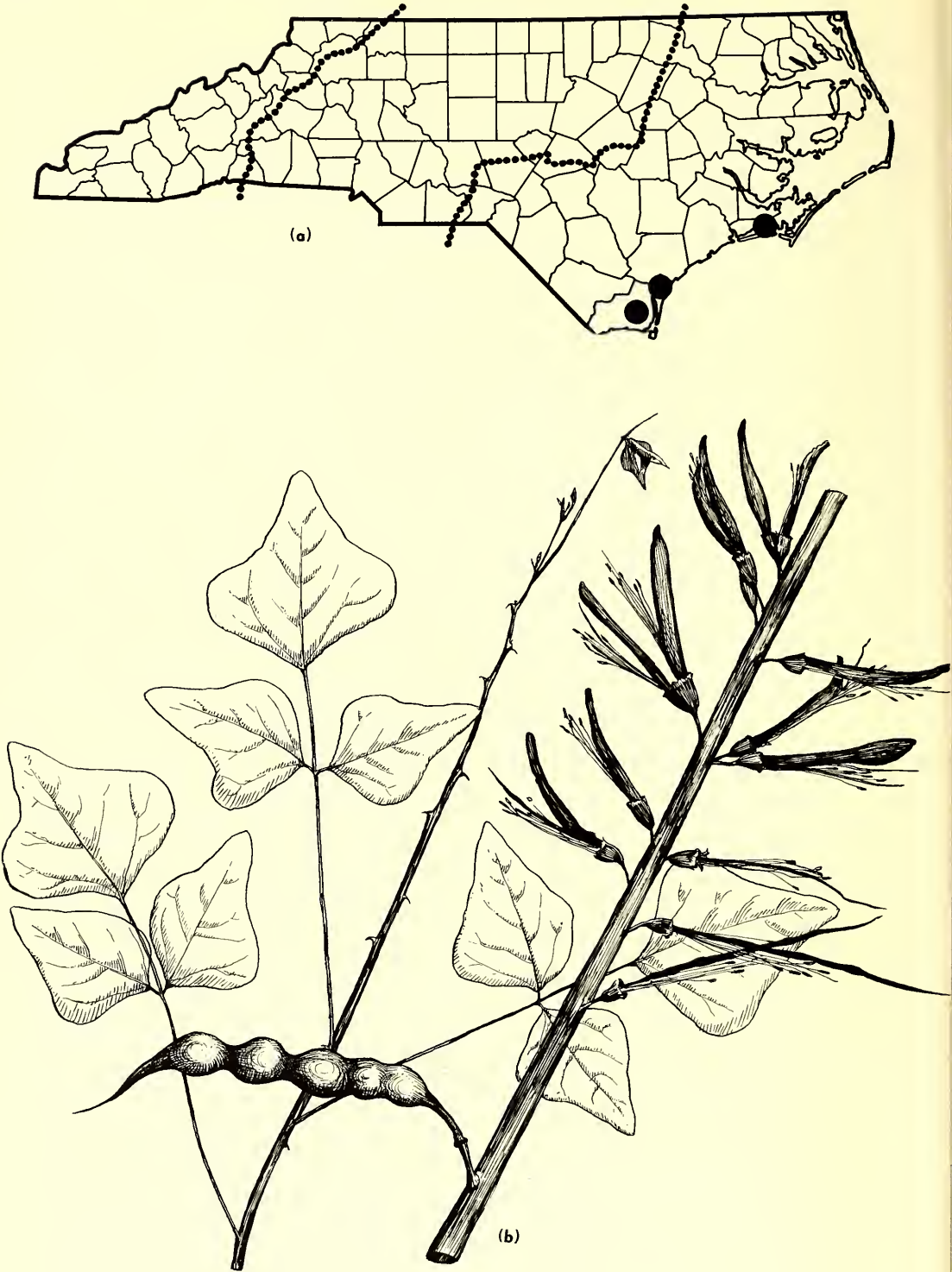


Fig. 124. *Erythrina herbacea*. (a) Distribution; (b) Habit sketch.

long with a more or less zig-zag rachis bearing 1-4 nodes each with an acute, ovate, striate, persistent bract about 1.5-3 mm long subtending a pedicel about 2-8(10) mm long surmounted by 2, acute to acuminate, persistent, striate, ovate bractlets mostly 0.8-1.2 cm long closely appressed to the calyx and more or less obscuring the calyx-tube. Calyx minutely puberulent throughout, the tube hemispheric, about 4-5 mm long, the lobes linear-subulate, 0.6-1.4 cm long, the lowermost longest, the lateral slightly shorter and the upper somewhat shorter than the laterals. Petals pale blue-violet to lavender, the standard 2.5-3.5 cm long, the wing and keel petals about equal and about 2 cm long. Legume linear, straight, compressed, about 7-14 cm long including the persistent style (of about 2-2.5 cm long) and about 4 mm wide.

DISTRIBUTION: New Jersey and Virginia west to Kentucky and Arkansas and south to Texas and Florida; also found in Mexico.

A variable species whose polymorphic leaves have attracted much taxonomic attention. Fernald recognizes var. *ellipticum* within our range and contrasts it with the typical element as follows:

Leaflets of most well-developed leaves ovate, tapering to a subacuminate apex.

..... var. *virginianum*

Leaflets of most well-developed leaves ovate-oblong to elliptic, blunt or rounded at tip

..... var. *ellipticum* (DC.) Fern.

Some of the specimens seen from North Carolina are the so-called var. *ellipticum* but the leaf-variation in a relatively large series of specimens is so great as to make one dubious of the wisdom of naming one of this species' numerous tendencies and particularly so since the variation appears to be almost continuous. I do not believe that this variant represents a geographic variety, it appears to be only one extreme in a highly polymorphic, wide-ranging species much deserving of additional study.

41. CLITORIA L., Sp. Pl. 753. 1753; Gen. Pl. ed. 5. 334. 1754.

Martusia Schult., Mant. 1: 69. 1822.

Erect herbs or trailing to climbing, herbaceous or woody vines or shrubs with alternate, pinnately compound, mostly 3-foliolate (or occasionally 1-, 5-, 7-, or 9-foliolate) leaves with long-persistent, striate stipules and usually stipellate, petiolulate leaflets. Flowers solitary or in few-flowered, short-pedunculate

racemes in the axils of the upper leaves, borne on short pedicels subtended by small, persistent, striate, often ovate to lanceolate bracts and with a usually larger pair of paired, persistent, striate bractlets closely appressed to the base of the calyx. Calyx somewhat irregular, the tube cylindric, the upper lobes somewhat united and shorter than the lateral and lowermost lobes. Corolla papilionaceous, mostly red, purple, blue or white or two-colored; the standard erect, broadly obovate or orbicular, often retuse, abruptly to gradually narrowed to the base, much larger than the wings or keel and lacking a spur; the wings shorter than and attached to about the middle of the strongly incurved but not twisted keel-petals. Stamens diadelphous, 9 and 1, or monadelphous with the uppermost stamen somewhat united below. Ovary stipitate with the strongly incurved style pubescent on the inner side and more or less flattened. Legume linear to linear-oblong, stalked, flattened, often with thickened sutures, beaked from the persistent style, with several to many seeds often partially separated by constrictions or partial septations, the valves twisting longitudinally on dehiscence.

A genus of perhaps 40 species of the tropics and warm temperate regions of both hemispheres. (Name derived from the small keel which Linnaeus thought suggestive of the clitoris. (See footnote Taxon 8: 296. 1959.)

1. CLITORIA MARIANA L., Sp. Pl. 753. 1753.

Martusia mariana (L.) Small, Man. SE. Flora 722. 1933.

Trailing or twining, climbing, herbaceous, perennial vine about 0.5-1 m long, glabrous to short-pubescent and becoming glabrate. Stipules ovate-lanceolate to lanceolate, subulate, striate, persistent, about 2-4 mm long. Petiole mostly about (1.5)2.5-6(8) cm long. Leaves pinnately 3-foliolate with glabrous to more rarely short-pubescent petiolules mostly 1.5-3 mm long and 1-3-nerved, persistent, setaceous to linear-subulate stipels about 3-5 mm long and the terminal leaflet on rachis-stalk mostly (0.5)1-2(2.5) mm long; leaflets mostly ovate, ovate-lanceolate, lanceolate, oblong to somewhat elliptic, with mucronate, acute to obtuse and often emarginate apex and obtuse to broadly rounded and sometimes slightly cordate base, glabrous above, glabrous to occasionally short-pubescent beneath, about (2)3-5(7) cm long and (1)1.5-2.5(3.5) cm wide. Racemes axillary on a peduncle about (0.5)1-4(6) cm long and usually shorter than



Fig. 125. *Centrosema virginiana*. (a) Distribution; (b) Habit sketch; (c) Fruit.

the subtending leaf, with usually 1-2(3) very large flowers on glabrous or rarely short-pubescent pedicels about (2)4-8(10) mm long subtended by one (or apparently by 2-several), striate, persistent, triangular to lanceolate bracts about (1)2-3 mm long and with a pair of larger, persistent, striate, linear bractlets (3)4-6 mm long at or near the summit of the pedicel. Calyx usually glabrous but rarely short-pubescent; the tube cylindric, about 1-1.4 cm long; the upper lobes broadly triangular, acute, about 4-6 mm long; the lateral lobes ovate-lanceolate, acuminate, about 5-7 mm long; the lowermost lobe lanceolate, acuminate, 6-8 mm long. Petals pale blue or lavender, the standard about 4-6 cm long and 3-4 cm wide. Legume oblong-linear, (3)4-6 cm long on an elongate stipe about 1-2 cm long and with persistent beak mostly 4-6 mm long or more. Seeds sticky and adherent.

DISTRIBUTION: Southern New York to Iowa and south to Florida and Texas and west to Arizona.

42. *RHYNCHOSIA* Lour., Fl. Cochinch. 561. 1793. *nom. conserv.*

Dolicholus Medic., Verles. Churpf. Phys. -Okon. Gesellsch. 2: 354. 1787.

Climbing, trailing or erect perennial herbs. Stipules ovate or lanceolate to subulate, persistent or deciduous. Leaves pinnately 3-foliolate or sometimes 1-foliolate, almost always without stipels. Racemes axillary or sometimes also terminal (or rarely flowers borne solitary or pairs) with several to numerous, loose to closely clustered, pedicellate flowers subtended by a caducous bract but lacking bractlets. Calyx-tube campanulate or tubular, nearly regular; calyx-lobes equal or nearly so, the upper two partially united. Corolla papilionaceous, yellow (elsewhere purple, white or greenish or with brown or purple streaked standard), the petals often equaling or shorter than the calyx, the standard obovate to suborbicular with basal auricles, the wings oblong, the keel somewhat incurved. Stamens diadelphous, 9 and 1. Legume usually oblong and flattened, 1-2-seeded.

A genus of about 150 species of the tropic and temperate regions of both hemispheres. (Name derived from the Greek *rhynchos* = a beak, alluding to the conspicuously beaked keel of some species.)

1. Leaves principally 1-foliolate.

2. Plants erect; base of leaflet usually truncate, broadly rounded, very broadly cuneate or only subcordate; stipels present ... 1. *R. reniformis*.

2. Plants prostrate and trailing; base of leaflets cordate; stipels lacking ... 2. *R. americana*.

1. Leaves principally 3-foliolate.

3. Plant prostrate, trailing or climbing; pubescence of the leaflet's lower surface more or less restricted to the primary, secondary and tertiary veins; calyx-lobes 6-9 mm long 3. *R. difformis*.

3. Plant erect; the pubescence of the leaflet's lower surface not restricted to the primary and secondary veins, densely grayish-tomentose; calyx-lobes 6 mm long or usually less 4. *R. tomentosa*.

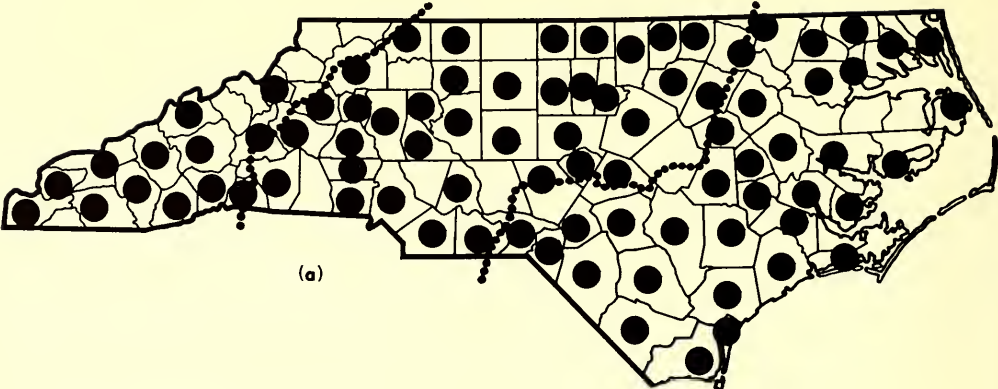
1. *RHYNCHOSIA RENIFORMIS* DC., Prodr. 2: 384. 1825.

Rhynchosia simplicifolia (Walt.) Wood, Class-Book 321. 1861 but not of DC., Prodr. 2: 389. 1825.

Dolicholus simplicifolius (Walt.) Vail, Bull. Torrey Club 26: 114. 1899.

Erect, perennial herb from slender, woody but often fusiform roots and with 1-several, densely short-pubescent, unbranching, striate and strongly angled stems mostly 0.5-2(2.5) dm high. Stipules linear-lanceolate, persistent, striate, spreading-pubescent, somewhat falcate or straight with acute to acuminate apex, about 5-10 mm long. Petioles densely spreading short-pubescent, striate, about (1.5)2-4(5) cm long and 1 mm in diameter. Leaves 1-foliolate (rarely the lower 3-foliolate), the leaflets depressed orbicular to reniform, with mucronulate, broadly rounded to obtuse or occasionally emarginate apex and truncate, broadly rounded to very broadly cuneate or subcordate base, thick and conspicuously reticulate and sparsely to densely pubescent especially along the veins on both surfaces and inconspicuously covered with numerous, minute, amber-colored glands above and below, mostly about (2)3-5 cm long and almost always broader than long, with densely, spreading short-pubescent petiolules about 2-4 mm long and a pair of setaceous, pubescent stipels about 1.5-2.5 mm long. Racemes axillary and terminal, sessile or nearly so or on peduncles up to 2 cm long, with densely white-hirsute peduncles and rachises mostly about 1-3 cm long with numerous, closely clustered flowers on densely pubescent pedicels about 1.5-3 mm long subtended by a caducous, linear-subulate, pubescent, reddish-brown bract about 3-5 mm long. Calyx densely hirsute to villous and with numerous, inconspicuous, amber-colored glands; the campanulate tube about 1.5-2 mm high; the lobes lanceolate to oblong-lanceolate with long-acuminate to subulate tip, about 6-9 mm long, almost equal. Petals yellow, about 6-8 mm long. Legume oblong, about (1)1.4-1.8 cm long and 5-7 mm wide, densely pubescent and with inconspicuous, amber-colored glands.

DISTRIBUTION: Coastal Plain from North Carolina south to Florida and west into Texas.



(a)



(b)

Fig. 126. *Clitoria mariana*. (a) Distribution; (b) Habit sketch.

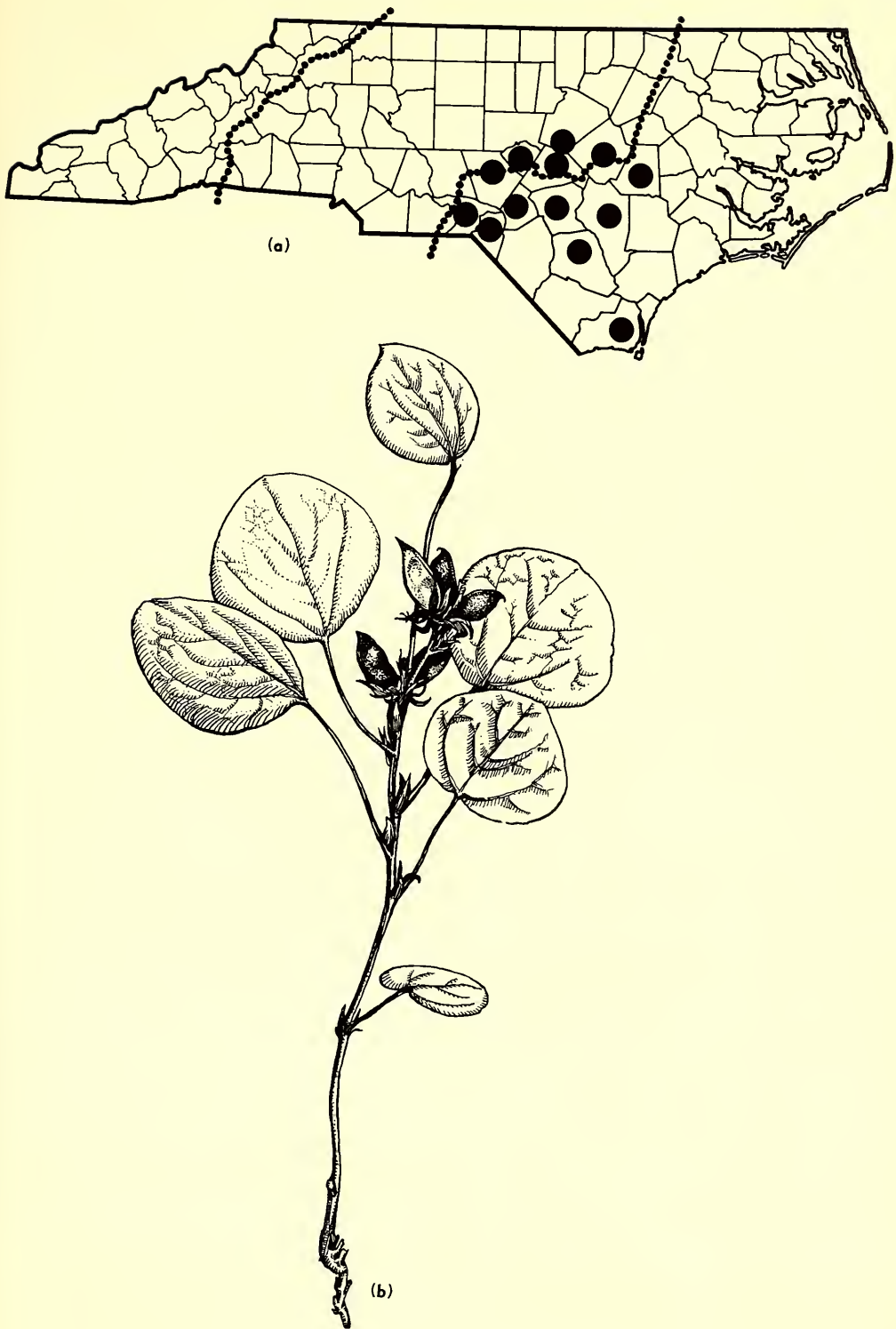


Fig. 127. *Rhynchosia reniformis*. (a) Distribution; (b) Habit sketch.

2. *RHYNCHOSIA AMERICANA* (Mill.)

M. C. Metz, Contr. Biol. Lab. Catholic Univ. Amer. 16: 126. 1934.

Dolicholus americanus (Mill.) Vail, Bull. Torrey Club 26: 111. 1899.

Prostrate or trailing, perennial herb from a thick woody root with several to numerous stems, sometimes twining above, striate, strongly angled to quadrate, more or less densely spreading short-pubescent throughout and 6-9 dm long or more. Stipules persistent, striate, pubescent, brownish, ovate-lanceolate to lanceolate, about 2-5 mm long. Petioles densely spreading pubescent, striate, about (1)2-4(5) cm long. Leaves 1-foliolate (or rarely the upper 3-foliolate); leaflets depressed orbicular to reniform, very broadly rounded at the apex and with a cordate base, thick, conspicuously reticulate, densely velvety pubescent on both surfaces, obscurely, if at all, glandular, mostly about 1.5-3(4) cm long and usually broader than wide, with densely pubescent petiolules about 1-2 mm long and lacking stipels. Racemes axillary or terminal, subsessile or with peduncle up to about 2.5 cm long, peduncle and rachis strongly angled and densely pubescent, about 1.5-3 cm long with loosely to more commonly closely clustered flowers on densely pubescent pedicels about 1-5 mm long subtended by caducous, linear-lanceolate, pubescent bracts about 2-3 mm long. Calyx densely hirsute, usually with inconspicuous, amber-colored glands; the campanulate tube about 1.5-2 mm high; the lobes linear, conspicuously striate, acute to acuminate, mostly 6-9(10) mm long, mostly 1-1.5(2) mm broad. Petals pale yellow, about 6-10 mm long. Legume oblong, mostly 1-1.5 cm long, about 5-7 mm wide, densely soft pubescent throughout and with inconspicuous amber-colored glands.

DISTRIBUTION: Southeastern Texas and adjacent Mexico.

The specimen upon which this record is based was originally identified as *R. Michauxii* Vail, a species known from peninsular Florida differing from *R. americana* in its larger, usually truncate or broadly cuneate leaves and foliaceous calyx-lobes often 3-4 mm wide and up to about 1.6 cm long. It is doubtful if *R. americana* has become established within our state.

3. *RHYNCHOSIA DIFFORMIS* (Ell.)

DC., Prodr. 2: 384. 1825.

R. tomentosa in the sense of most authors prior to Rhodora 44: 421-425. 1942.

Perennial, prostrate or climbing herb from a woody, often tuber-bearing root with 1-several, trailing or twining, striate, strongly angled to quadrate stems about 0.5-1 m long and more or less reflexed or spreading tawny-pubescent throughout but especially so along the angles. Stipules ovate to ovate-lanceolate, acute, striate, persistent, reddish-brown pubescent and about 3-8 mm long. Petioles strongly angled to quadrate, densely pubescent especially on the angles, grooved above, mostly (1)2-3(4) cm long. Leaves estipellate, pinnately compound; the lowermost usually 1-foliolate, those above 3-foliolate; the densely pubescent, angled or quadrate, grooved rachis-stalk of the terminal leaflet about 0.5-1.5(2) cm long; leaflets of the 1-foliolate leaves reniform, the others usually orbicular to ovate or broadly elliptic, the lateral asymmetrical, about 1.5-3(4) cm long, mucronulate, broadly rounded to obtuse at apex and with broadly rounded, obtuse to subcordate base, conspicuously reticulate, short-pubescent and with numerous, inconspicuous, minute, amber-colored glands on both surfaces, with a densely short-pubescent petiolule about 2-3(4) mm long. Racemes axillary, about 1.5-3(4) cm long, subsessile or with peduncles up to about 3 cm long, the peduncle and rachis densely pubescent, with about 2-8 closely clustered flowers on densely pubescent pedicels about (1)2-4(5) mm long subtended by a pubescent, caducous, linear bract about 2-4(5) mm long subtended by a pubescent, caducous, linear bract about 2-4(5) mm long and lacking bractlets. Calyx densely and more or less appressed-pubescent with inconspicuous amber-colored glands; the campanulate tube 1.5-2 mm high; the lanceolate to ovate-lanceolate lobes acuminate or subulate-tipped, about equaling one another and 6-9(10) mm long. Petals yellow, about 7-9 mm long. Legume oblong, about 1.5-2 cm long and 6-8 mm wide, pilose and with inconspicuous, amber-colored glands.

DISTRIBUTION: Coastal Plain from southeastern Virginia to Florida, west into Texas and north into Missouri.

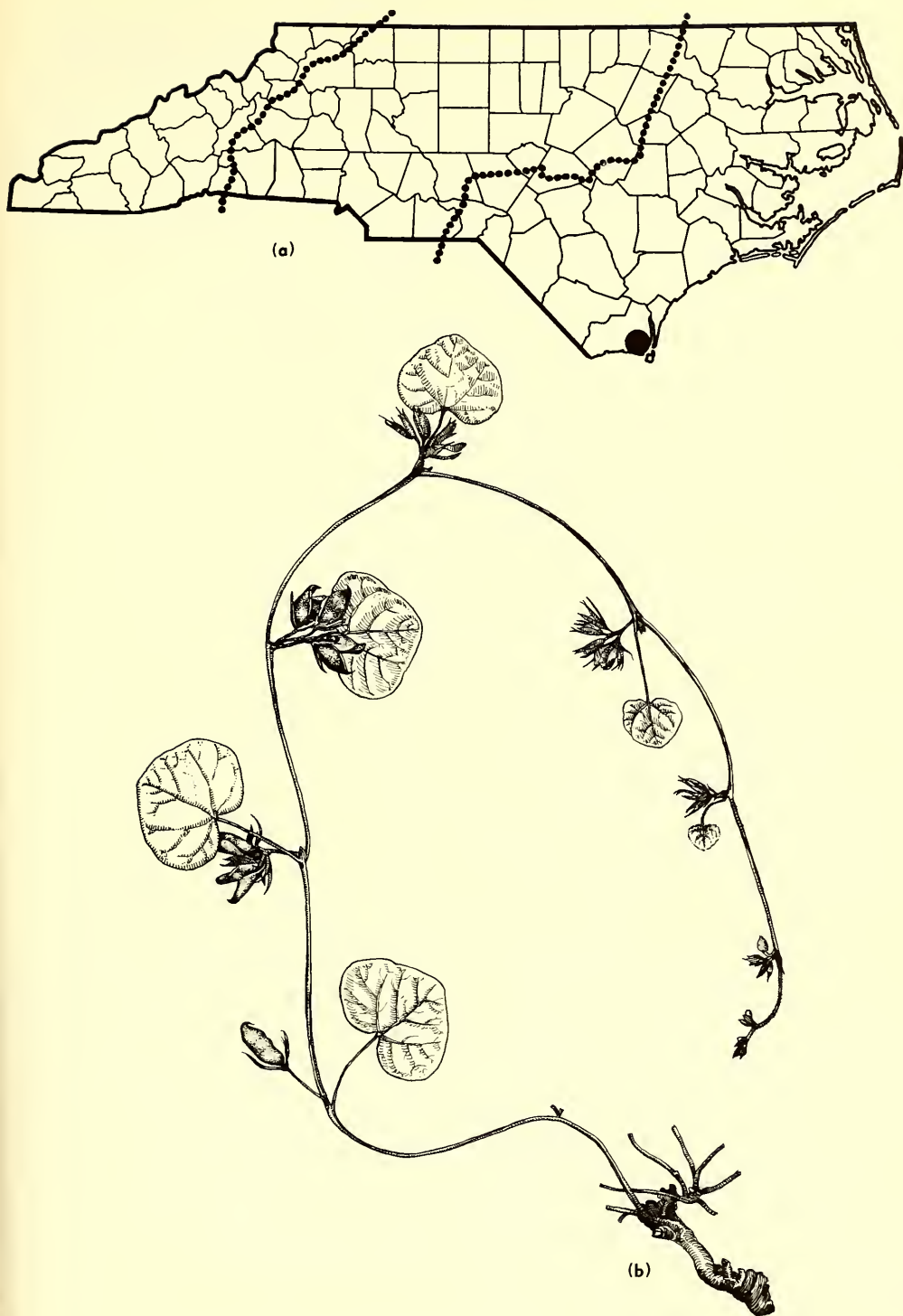


Fig. 128. *Rhynchosia americana*. (a) Distribution; (b) Habit sketch.

4. *RHYNCHOSIA TOMENTOSA* (L.)
H. & A., Comp. Bot. Mag. 1: 23. 1835.

R. erecta (Walt.) DC., Prodr. 2: 384. 1825.
Dolicholus Drummondii Vail, Bull. Torrey
Club 26: 116. 1899.

Dolicholus erectus (Walt.) Vail, Bull. Torrey
Club 26: 115. 1899.

Erect, perennial herb from a woody root with 1-several, simple or branching stems usually terete or nearly so below but becoming strongly angled to quadrate above, densely pubescent throughout but especially spreading villous on the angles, about (1.5)3-7(9) dm high. Stipules linear-lanceolate, acute to acuminate, soon deciduous, striate, pubescent, reddish-brown, about 4-8(10) mm long. Petioles striate, conspicuously angled to quadrate, densely ascending to spreading pubescent, mostly 2-6 cm long. Leaves pinnately 3-foliolate, estipellate; the densely pubescent, more or less quadrate rachis-stalk of the terminal leaflet about (1)3-8(12) mm long; leaflets mostly ovate, ovate-oblong or oblong, but also rhombic-ovate, elliptic or obovate with a broadly rounded or obtuse to somewhat acute, mucronulate apex and a broadly rounded, obtuse, subcordate to broadly cuneate base, thick, very conspicuously reticulate, moderately to densely, appressed to somewhat ascendent, short-pubescent with few to numerous, inconspicuous, amber-colored glands above and velvety grayish-tomentose with usually numerous, amber-colored, inconspicuous glands on the lower surface, mostly 2-7 cm long and about $\frac{1}{2}$ - $\frac{3}{4}$ as wide, with densely pubescent petiolules about 1.5-3 mm long. Racemes axillary or terminal, subsessile or with peduncle up to 2 cm long, peduncle and rachis 1.5-3(4) cm long, densely pubescent with numerous, closely clustered flowers on densely short-pubescent pedicels about 1-2(3) mm long subtended by a caducous, linear-subulate to setaceous, reddish-brown, pubescent bract about 2-8 mm long. Calyx densely ascendent grayish-pilose and with numerous, inconspicuous, amber-colored glands; the calyx-tube campanulate, about 1.5-2 mm high, the lobes linear-subulate, about 4-6 mm long, the upper 2 united for about half their length. Petals yellow, the standard about 5-7 mm long. Legume oblong, about 1.2-1.6 cm long and 5-7 mm wide, pubescent with short hairs about 0.5-1 mm long and also with numerous, macroscopically inconspicuous, amber-colored glands.

DISTRIBUTION: Delaware to North Carolina and Tennessee and south to Florida and Texas.

43. *PHASEOLUS* L., Sp. Pl. 723. 1753;
Gen. Pl. ed. 5. 323. 1754.

Annual or perennial, herbaceous (rarely woody at base), prostrate or climbing vines or sometimes erect herbs. Leaves pinnately 3-foliolate (rarely 1-foliolate) with persistent, striate stipules often lobed at base and with stipels. Racemes axillary with pedicellate flowers subtended by a usually persistent bract and with 2 bractlets at or near the top of the pedicel. Calyx campanulate with the upper two lobes united or free and shorter than the lateral and lowermost lobes. Corolla papilionaceous, purple, red, violet, yellow or white; the standard orbicular, short-clawed and distinctly to indistinctly auriculate, wings obovate, clawed, cohering to the keel-petals; keel spirally coiled one or more times. Stamens diadelphous, 9 and 1. Ovary sessile or nearly so, style coiled and bearded along the inner side. Legume terete or compressed, straight or curved, dehiscent.

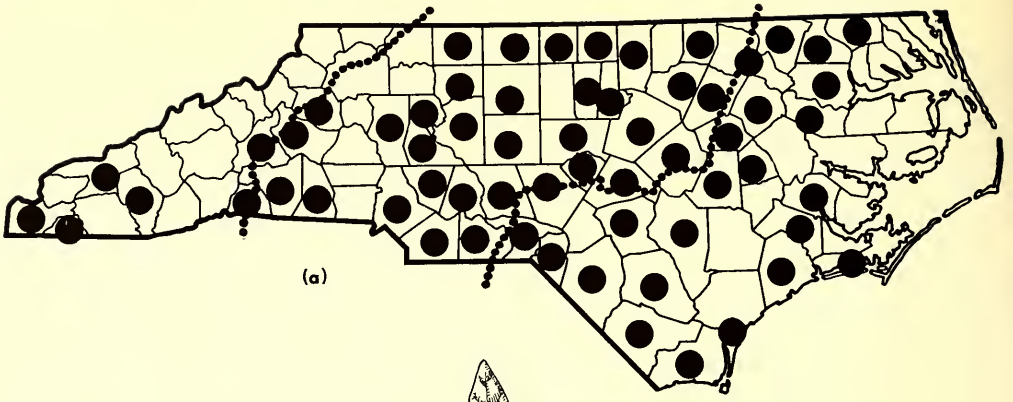
A genus of 150-200 species of the tropic and temperate regions of both hemispheres. (The ancient Greek name of some edible legume.) The English common name for this group is BEAN.

1. Stem trailing; leaflets deltoid and usually 3-lobed, obtuse; racemes unbranched at base and apparently only 1/axil 1. *P. sinuatus*.

1. Stem usually climbing; leaflets usually ovate and unlobed, acute to acuminate; racemes often branching at base and then apparently 2-several/axil 2. *P. polystachios*.

1. *PHASEOLUS SINUATUS* Nutt. ex. T.
& G., Fl. N. Am. 1: 279. 1839.

Prostrate, trailing, perennial, herbaceous vine from a thick woody root and with strongly angled to quadrate, usually striate, minutely spreading, short-pubescent to glabrate, branching stems mostly 1-4 m long. Stipules striate, triangular to linear-lanceolate, mostly 2-4 mm long. Petioles straight, minutely spreading short-pubescent, about 2-5 (7) cm long. Leaves pinnately 3-foliolate, the puberulent rachis-stalk of the terminal leaflet about (0.5)1-1.5(2) cm long; leaflets deltoid-ovate in general outline and commonly with 3 prominent lobes, obtuse or broadly rounded to the mucronulate apex, truncate or broadly cuneate at base, conspicuously reticulate, coriaceous, glabrate or minutely pubescent along the veins, about 2-4(5) cm long, and about as broad as long or even somewhat



(a)



(b)

Fig. 130. *Rhynchasia tomentosa*. (a) Distribution; (b) Habit sketch.

broader but occasionally somewhat narrower, with puberulent petiolules about 2-4 mm long and oblong to ovate-lanceolate, and usually spreading stipels about 1-2.5 mm long. Racemes axillary, simple, solitary, elongate, flexuous, usually 1-3 dm long or often 5-times or more as long as the subtending leaf, puberulent, with peduncle usually equaling or longer than the rachis and bearing few to several, scattered flowers on minutely pubescent pedicels about 5-10 mm long subtended by a striate, ovate-lanceolate bract about 2-3 mm long and with a pair of ovate to elliptic bractlets about 0.6-1 mm long at or near the top of the pedicel. Calyx glabrous except for the minutely ciliate margins, the tube campanulate, about 1.5-2.5 mm high, the upper lobes broadly rounded, about 0.2-0.4 mm long, the lateral lobes broadly rounded, about 0.5-0.6 mm long, the lowermost lobe broadly triangular to ovate-lanceolate, acute, about 1 mm long. Petals pale-purple, about 7-9 mm long, the standard about 8-10 mm wide, reflexed. Legume stipitate, linear-oblong, about 3.5-4.5 cm long and 7-9 mm wide and curved, glabrous.

DISTRIBUTION: Coastal Plain from North Carolina south to Florida and west to Mississippi.

2. PHASEOLUS POLYSTACHIOS (L.) BSP., Prel. Cat. N. Y. 15. 1888.

Perennial, trailing or more commonly climbing, herbaceous vine from a woody root with twining stems mostly 1-4 m long, branching, terete to strongly angled, and more or less densely short-pubescent throughout. Stipules lanceolate, striate, about 2.5-4 mm long. Petioles densely spreading short-pubescent, mostly (2)3-6(9) cm long. Leaves pinnately 3-foliolate, the spreading short-pubescent rachis-stalk of the terminal leaflet mostly about (0.5)1-2(2.5) cm long; leaflets ovate to rhombic-ovate, the lateral leaflets often strongly asymmetrical, mucronulate, acute to acuminate, with broadly rounded, truncate or broadly cuneate base, about (2)3-8(13) cm long and mostly not more than about $\frac{1}{2}$ - $\frac{3}{4}$ as broad as long, conspicuously reticulate, glabrous to sparsely short-pubescent above, more or less densely and softly pubescent beneath feeling velvety but the hairs short, and with short-pubescent petiolules about 2-4(6) mm long and with linear spreading stipels about 1-2 mm long. Racemes axillary, slender, flexuous, often branching at the base and thus 2-several appearing at a node, with densely short-pubescent peduncle and rachis about 0.7-1.5(2) dm long with several to numerous flowers with nodes about 5 mm apart on slender, glabrate to sparsely short-

pubescent pedicels about 3-8 mm long subtended by linear, acute, pubescent, persistent, spreading bracts about 3-4 mm long and with a pair of oblong to elliptic, appressed, pubescent bractlets about 0.6-0.8 mm long. Calyx glabrous to very sparsely or sometimes densely short-pubescent; the tube campanulate, about 2-2.5 mm long; the upper lobes broadly rounded, about 0.2-0.3 mm long, the lateral lobes broadly triangular, obtuse to acute, about 0.5-0.7 mm long, the lowermost narrowly triangular, acute, about 0.8-1 mm long. Petals purple to whitish, about 1-1.2 cm long. Legume oblong-linear, somewhat curved, about 3-6(8) cm long and 8-10 mm wide, stipitate, flattened, glabrous, valves spirally twisting after dehiscence.

DISTRIBUTION: Southern Connecticut west into Iowa and south into Florida and Texas.

Fernald (Rhodora 44: 418 + 419. 1942; 1950, p. 936) recognized two varieties of this species and both were reported by him as occurring in North Carolina. These were distinguished by him as follows:

1. Leaves firm, not quickly wilting, minutely scabridulous above, softly subvelutinous beneath, when fresh strongly adherent, the larger leaflets 4-8(10) cm long; rachis usually short-hispid, with straightish divergent hairs; calyx when dry relatively thin, the veins and veinlets evident; seeds flattened on both sides, black or black and gray, 5-10 mm long, 5-6.5 mm broad 2a. var. *polystachios*.
1. Leaves submembranaceous, promptly wilting, smooth and glabrous or glabrescent above, less pilose beneath, only slightly adherent, the larger leaflets up to 13 cm long; rachis usually with inflexed pilosity; calyx (when dry) of thicker texture, its veins obscure or invisible; seeds strongly biconvex, reddish black; 5-8 mm long, 4-6 mm broad 2b. var. *aquilonius*.

A) P. POLYSTACHIOS var. POLYSTACHIOS.

Range: Southern New Jersey, West Virginia to Iowa and Nebraska south to Florida and Texas.

B) P. POLYSTACHIOS var. AQUILONIUS Fernald. Rhodora 44: 418. 1942.

Range: Southern Connecticut, southeastern New York to Delaware and Virginia and upland North Carolina.

The specimens seen by me, including all of those at the Gray Herbarium upon which Fernald based his conclusions, do

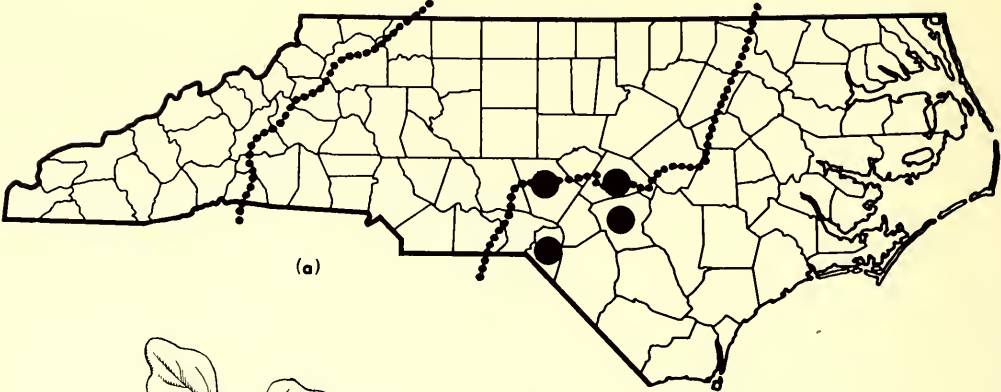


Fig. 131. *Phaseolus sinuatus*. (a) Distribution; (b) Habit sketch.

not appear divisible into two varieties. The characteristics supposedly distinguishing the two taxa do not seem to be at all consistently linked together and a number of the specimens annotated by Fernald as belonging to one variety possessed characteristic features of the others. It is not felt that Fernald's varieties can be objectively recognized. Further investigation must of necessity await the accumulation of considerable more material than now exists.

44. VIGNA Savi, Mem. Phas. 3: 7. 1824.

Trailing or climbing, perennial or annual, herbaceous vines (or rarely somewhat upright) with stipulate, pinnately 3-foliolate leaves with petiolulate, stipellate leaflets. Racemes axillary with usually elongate peduncles and few to several, closely clustered, pedicellate flowers subtended by caducous, small bracts and with a pair of caducous bractlets at or near the top of the pedicel. Calyx campanulate, somewhat 2-lipped, the upper lobes partly or completely united, longer than the lateral lobes but shorter than the lowermost. Corolla papilionaceous, yellow or purple; the standard orbicular, often broader than long, auriculate at base; wings obovate and auriculate; the keel-petals about as long as the wings and curved but not spirally coiled. Stamens diadelphous, 9 and 1. Ovary sessile; style bearded along the inner side. Legume linear, terete or nearly so.

A genus of perhaps 60 species of tropical and warm temperate regions of both hemispheres. (Named in honor of Dominicus Vigna, an Italian scientist of the seventeenth century.)

1. Corolla yellowish; legume pubescent, 7 cm long or less 1. *Vigna luteola*.
1. Corolla purplish to violet; legume glabrous, 10 cm or more long 2. *Vigna unguiculata*.

1. VIGNA LUTEOLA (Jacq.) Benth., Fl. Bras. 15: 194. 1859.

Vigna repens (L.) O. Kuntze, Rev. Gen. 1: 212. 1891 but not Baker, 1876.

Trailing or climbing, perennial (in ours?), herbaceous vine 1-3 m long or more with branching, striate, glabrous to retrorsely pubescent stems. Stipules ovate-lanceolate to lanceolate, acute to acuminate, 3-5-nerved, pubescent, about 2-3.5 mm long. Petioles stri-

ate, retrorsely appressed-pubescent, about 1.5-6 cm long. Leaves pinnately 3-foliolate, the glabrate to antrorsely pubescent rachis-stalk of the terminal leaflet mostly about 0.7-1.2 cm long; leaflets ovate to lanceolate or linear-lanceolate, acute, with obtuse to broadly cuneate base, about (2)3-8 cm long, with both surfaces more or less sparsely appressed-pubescent; petiolules pubescent, about 1-2 mm long; stipels linear to oblong, about 1-2 mm long. Racemes axillary on elongate peduncles usually several-times longer than the subtending leaf and terminated by few to several closely clustered flowers on retrorsely pubescent pedicels about 1-2(3) mm long subtended by a pubescent, caducous bract about 1-1.5 mm long and with a pair of caducous, 1-nerved, pubescent bractlets about 1-1.5 mm long at or near the top of the pedicel. Calyx glabrous or sparingly appressed-pubescent except for the short-ciliate lobes, the tube 2-2.5 mm long, the upper lobes united, about 2 mm long, the lateral lobes triangular, acute, about 1.5 mm long, the lowermost lobes linear-subulate and about 2.5 mm long. Petals yellow, the standard almost reniform, apically notched, about 1.4-1.8 cm long and 1.8-2.3 cm wide. Legume linear, about 4-6.5 cm long, appressed-pubescent.

DISTRIBUTION: Along the coast from North Carolina to Florida and west to Texas; also found in the West Indies and tropical America.

2. VIGNA UNGUICULATA (L.) Walp., Repert. Bot. 1: 779. 1842.

Vigna sinensis (L.) Endl. ex Hassk., Pl. Jav. Rar. 386. 1848.

Trailing or climbing, annual, herbaceous vine with glabrous to slightly pubescent stems mostly 0.5-3 m long. Stipules lanceolate, up to 1.5 cm long. Leaves pinnately 3-foliolate with more or less glabrous, ovate to ovate-hastate leaflets about (4)8-15 cm long, acute to acuminate, and with the lateral ones conspicuously inequilateral. Inflorescence long-pedunculate, 1.5-2.5 dm long. Petals mostly purplish; the standard 1.5-2.5 cm long. Legume glabrous, linear, fleshy, (1)1.5-3 dm long and 1 cm broad.

DISTRIBUTION: The COWPEA or BLACK-EYED PEA was introduced from Asia and is now widely cultivated; it has become naturalized or adventive from Delaware to Illinois and Missouri and south to Florida and Texas.

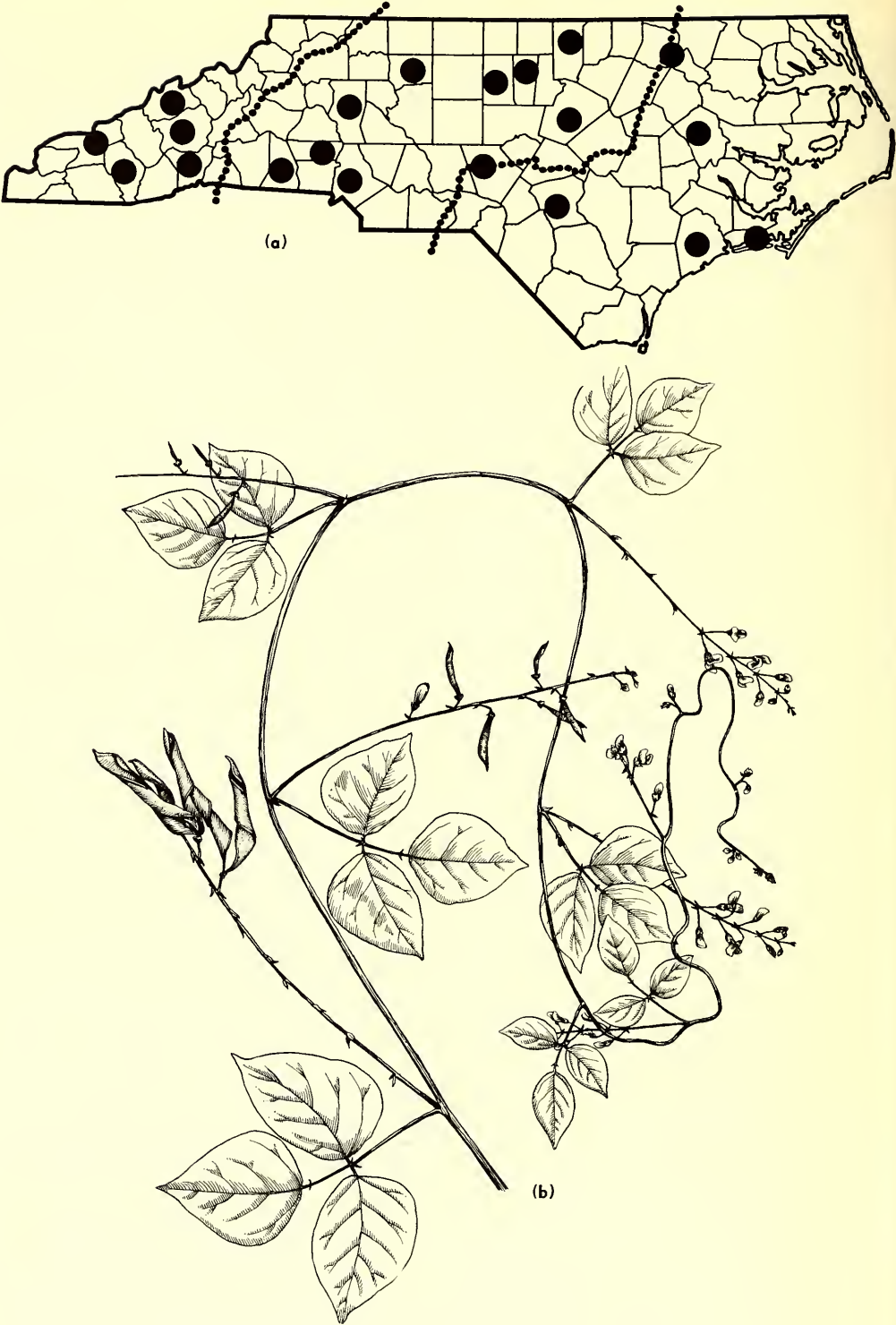


Fig. 132. *Phaseolus polystachios*. (a) Distribution; (b) Habit sketch.

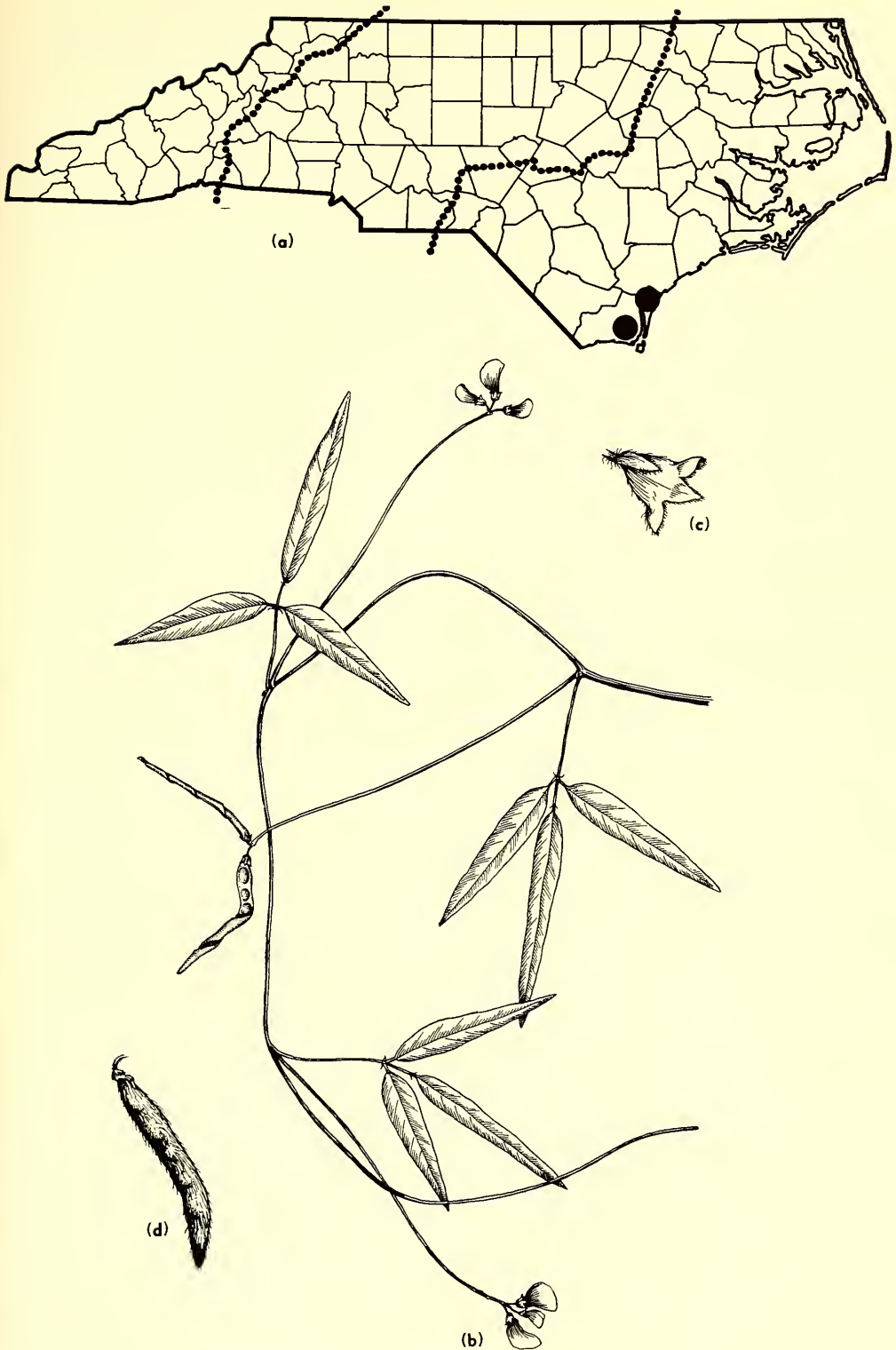
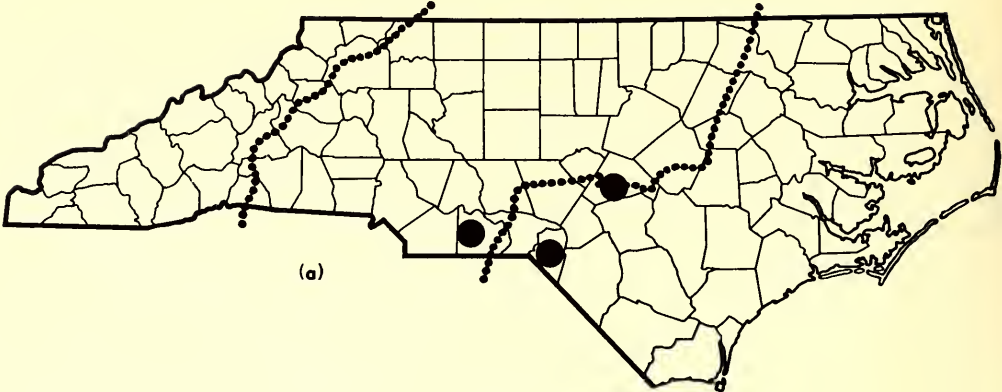
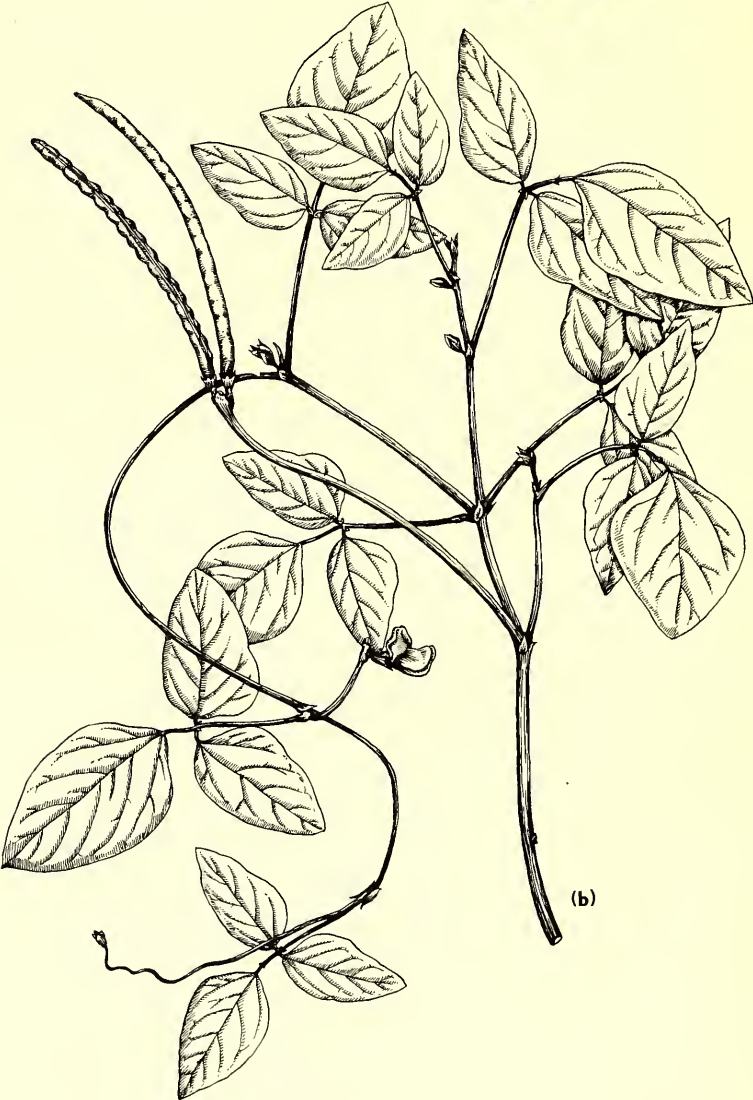


Fig. 133. *Vigna luteola*. (a) Distribution; (b) Habit sketch; (c) Calyx showing subtending bractlet; (d) Fruit.



(a)



(b)

Fig. 134. *Vigna unguiculata*. (a) Distribution; (b) Habit sketch.

45. STROPHOSTYLES Ell., Sk. Bot. S. C.
& Ga. 2: 229. 1823.

Annual or perennial, herbaceous vines with trailing, twining or climbing, branching stems. Stipules striate, small and persistent. Leaves petiolate, pinnately 3-foliolate with petiolulate, stipellate leaflets. Racemes axillary, long-pedunculate with few to several, closely-clustered, apparently subcapitately arranged, subsessile flowers subtended by a small bract and with a pair of bractlets just beneath the flower. Calyx irregular, more or less 2-lipped, the tube campanulate, the upper lobes almost completely fused, the lowermost lobe the longest. Corolla papilionaceous, pink, purple or nearly white, the standard orbicular or broadly ovate, the oblong wings shorter than the strongly incurved, beaked keel. Stamens diadelphous, 9 and 1. Ovary sessile or nearly so; style curved, bearded along its inner side. Legume linear, somewhat compressed, the valves spirally twisting laterally after dehiscing and with several woolly seeds.

A genus of about 3 species endemic to eastern North America and closely related to *Phaseolus* with which it is sometimes united. (Name derived from the Greek *strophe* = twining and *stylos* = a style in reference to the curved style.)

1. Bractlets just beneath flower lanceolate, acute, almost equaling to slightly exceeding the calyx-tube in length; plants annual; leaflets usually ovate, often lobed; seeds mostly over 6 mm long 1. *S. helvola*.
1. Bractlets just beneath flower ovate or oblong, obtuse, half as long as the calyx-tube or less; plants perennial; leaflets oblong, lanceolate or narrowly ovate, typically unlobed; seeds less than 6 mm long 2. *S. umbellata*.

1. STROPHOSTYLES HELVOLA (L.)
Ell., Bot. S. C. & Ga. 2: 230. 1823.

At first a low, erect (up to 1.5-4 dm high) but soon trailing or twining, herbaceous annual vine with decumbent or climbing, branching, glabrous to spreading-pilose, striate stems 0.2-2 (or up to 10) m long. Stipules lanceolate, striate, persistent, about 2.5-3.5 mm long. Petioles striate, glabrous to sparsely spreading-pilose, mostly 2-5 cm long. Leaves pinnately 3-foliolate, the rachis-stalk of the terminal leaflet mostly 0.8-1.2(1.5) cm long; leaflets ovate, rhombic-ovate to ovate-oblong, or commonly 3-lobed and pandurate, with a mucronate, broadly rounded to acute apex and broadly rounded to broadly cuneate base, glabrous to sparingly strigose on both surfaces, cm wide, with spreading, short-pubescent

petiolules about 1-2 mm long and spreading, linear-oblong stipels about 1-1.5 mm long. Racemes axillary, the peduncle conspicuously angled, about 0.5-1.5(2) dm long, terminated by small, head-like clusters of few-several flowers, subsessile or on pedicels up to 1 mm the larger 2-6(8) cm long and (0.8)2-4(6.5) long subtended by striate, linear bracts about 1-2 mm long and with 2 larger, striate, lanceolate to oblong-lanceolate, acute, persistent bractlets about 2-3 mm long nearly equaling to slightly longer than the calyx-tube. Calyx-tube glabrous or sparsely appressed-pubescent, campanulate, 1.5-2.5(3) mm long, the lobes glabrous or nearly so except for the often strigose lowermost lobe, unequal, the laterals triangular, acuminate, the lowermost linear-subulate and about 2.5-3 mm long, the uppermost almost completely united and about 2 mm long. Petals pink or purple, often turning greenish on drying, the standard 0.8-1.3 (1.5) cm long and 1-2 cm wide. Legume linear, about (3.5)5-7(10) cm long and 5-8 mm wide, sparsely appressed-pubescent, with woolly seeds about 6-10(12) mm long.

DISTRIBUTION: Southern Quebec to Minnesota and South Dakota and south into Texas and Florida.

Fernald (Rhodora 44: 421. 1942) recognized two varieties within this species of BEAN or WILD BEAN. Gleason (1952, p. 452) and Gambill (1953, p. 95) studied the proposed variety, *S. helvola* var. *missouriensis* (S. Wats.) Britt. (= *S. missouriensis* (S. Wats.) Small) and concluded that variation within the species was so continuous that it appeared to them impossible to maintain the extreme as a separate entity. Fernald knew of no specimens of var. *missouriensis* from the area between northern Florida and southern Virginia. He distinguished them as follows:

1. Stems up to 2 m long, trailing or twining; leaflets often 3-lobed and fiddle-shaped or, when unlobed, ovate and tapering by straight sides to the acuminate tip, the terminal leaflets 2-6.5 cm long and 0.8-4 cm wide; standard 0.8-1.3 cm long; legume 3.5-8.5 cm long; seeds 6-9.5 mm long *S. helvola* var. *helvola*.
1. Stem climbing 3-10 m high; leaflets rounded-ovate to rhombic-ovate, unlobed, with gradually rounded sides to blunt or subacute apices, the terminal leaflet 4-8 cm long and 3-6.5 cm wide; standard 1-1.5 cm long; legume 5-10 cm long; seeds 8-12 mm long *S. helvola* var. *missouriensis* (S. Wats.) Britt.

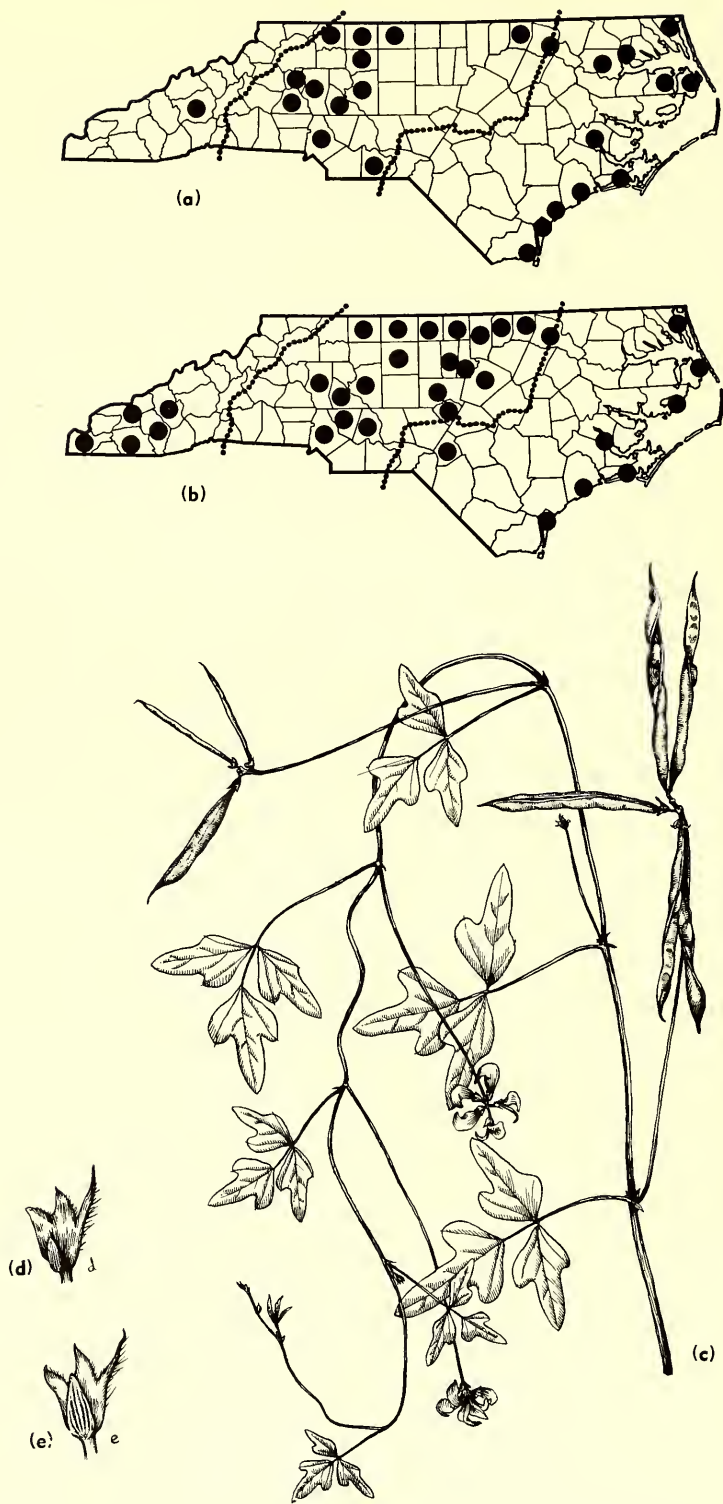


Fig. 135. *Strophostyles helvola* and *S. umbellata*. (a) Distribution of *S. helvola*; (b) Distribution of *S. umbellata*; (c) Habit sketch of *S. helvola*; (d) Calyx and bractlet of *S. helvola*; (e) Calyx and bractlet of *S. umbellata*.

Although only the first of these variations is at present known to me from North Carolina both are perhaps to be expected. Further study is required to evaluate critically the different conclusions reached by different authors on the variations known within this group.

2. STROPHOSTYLES UMBELLATA (Muhl. ex Willd.) Britt., Ill. Fl. 2: 339. 1897.

Trailing, perennial, herbaceous vine with slender, branching, procumbent stems about 0.3-1.5(2) m long with at least the younger portions more or less densely and retrorsely or spreading pubescent. Stipules striate, ovate-lanceolate, about 2-2.5 mm long. Petioles usually densely pubescent, channeled above, mostly about 1-5 cm long. Leaves pinnately 3-foliolate, the rachis-stalk of the terminal leaflet mostly about 3-8 mm long; leaflets broadly to narrowly ovate, lanceolate to elliptic or oblong, unlobed, with mucronulate, broadly rounded to acute apex and a broadly rounded, obtuse or occasionally broadly cuneate base, the larger mostly about 2-5 cm long and 0.4-2 cm wide, glabrous or nearly so above, glabrous or appressed-pubescent beneath, with short-pubescent petiolules 1-2 mm long and oblong, obtuse, spreading stipels about 1-1.5 mm long. Racemes axillary, the conspicuously angled peduncle about 1-2.5 dm long terminated by few to several, almost capitate clustered flowers subsessile or on pedicels up to 1 mm long subtended by a minute, oblong bract up to 0.7 mm long and with a pair of ovate to oblong, obtuse, striate bractlets about 0.8-1 mm long near or at the summit of the pedicel and mostly less than $\frac{1}{2}$ as long as the calyx-tube. Calyx-tube glabrous or nearly so, campanulate, about 2-2.5 mm long; the lobes glabrous except for the ciliate margins and the usually strigose lowermost lobe, the upper lobes almost completely united, broadly rounded, about 1.5 mm long, the lateral lobes triangular, acute, about 1-1.5 mm long; the lowermost linear-subulate, about 1.5-2 mm long. Petals pink or pale-purple, often fading yellowish, the standard about 1-1.2(1.4) cm long. Legume linear, 3-6.5 cm long and only about 4 mm wide, sparsely appressed-pubescent, with woolly seeds about 3-4.5(6) mm long.

DISTRIBUTION: Florida to Texas and north to southern New York and to Indiana, Missouri and Oklahoma.

46. GLYCINE L., Pl. 753. 1753; Gen. Pl. ed. 5. 334. 1754.

Climbing or trailing vines or rarely erect herbs with stipulate and stipellate, pinnately compound leaves (usually 3-foliolate or less commonly 5- or 7-foliolate). Stipules small and free from the petiole. Flowers almost always in axillary racemes either borne singly or in clusters along the rachis (or the lowermost solitary in the axils); the pedicels subtended by small bracts and with small, often setaceous bractlets at or near the top of the pedicel. Calyx-tube more or less campanulate, the 2 upper lobes united to or above the middle, the 3 lower free. Corolla papilionaceous, standard suborbicular or obovate, tapering to the weakly auriculate base, spreading and not inflexed; the wings small and loosely adhering to short, obtuse keel. Stamens monadelphous or the vexillary partly to completely free and then diadelphous. Ovary nearly sessile and topped by a slightly incurved, beardless style and with a terminal, globose stigma. Legume linear to oblong, straight to somewhat curved, compressed or terete, dehiscent, few-to-many-seeded and septate between the seeds.

A genus of perhaps 40 species of the tropics and temperate regions of the Old World. (Name derived from the Greek *glycys* = sweet; reference obscure.)

1. GLYCINE MAX (L.) Merr., Interpr. Rumph. Herb. Amboin. 274. 1917.

Soja Max (L.) Piper, U.S.D.A. Bur. Pl. Ind. Invent. Seeds & Pl. Import. No. 33, 53. 1915.

More or less erect, annual, bushy herb about 0.5-1.5(2) m high and occasionally with some branches vine-like, densely villous throughout. Stipules densely pubescent, ovate-lanceolate to lanceolate, about 3-8 mm long, soon deciduous. Leaves pinnately 3-foliolate with elongate, densely villous petioles about 1-3(4) dm long; the leaflets broadly ovate to ovate-lanceolate, commonly 6-15 cm long, with an apiculate and obtuse to acute apex, both surfaces densely spreading pubescent especially along the margin and veins with densely villous, short petiolules and obscure stipels. Racemes axillary, short, erect with (1)3-8(12), short-pedicellate, often closely associated or densely clustered, inconspicuous flowers subtended by subulate bracts about 2-3 mm long and linear-subulate bractlets

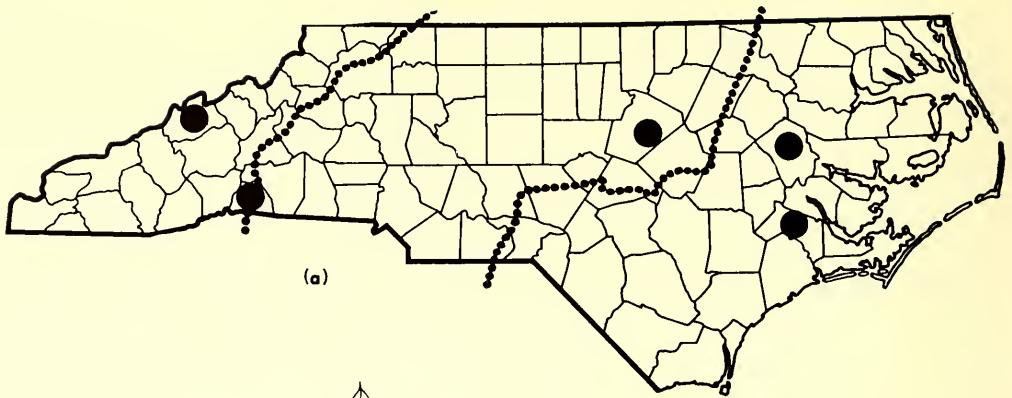


Fig. 136. *Glycine Max.* (a) Distribution; (b) Habit sketch.

about 2-3 mm long obscured by the densely villous rachis, calyx and pedicel. Calyx-tube campanulate and about as long as the narrowly lanceolate to subulate lobes. Petals purple, roseate or white, about 5-8 mm long, the standard emarginate and short-clawed and but little longer than the wings but almost twice as long as the keel. Stamens diadelphous. Legume pendent, shortly stalked, (2)3.5-5(8) cm long and about 1 cm wide, straight or somewhat curved, densely villous-pubescent, tardily dehiscent, about 2-4-seeded.

DISTRIBUTION: The SOYBEAN was introduced from the Orient and, although widely cultivated and sometimes escaping, it scarcely persists and there is no evidence that it will become naturalized.

47. *PUERARIA* DC., Ann. Sci. Nat. I. 4: 97. 1825.

Trailing or high-climbing, woody or herbaceous vines or shrubs. Leaves pinnately 3-foliate with ovate-lanceolate, herbaceous stipules, and ovate to rhombic, often lobed leaflets and setaceous stipels. Panicle raceme-like, terminal or axillary, with 1-several pedicellate flowers per node subtended by caducous bracts and with a pair of caducous bractlets at or near the top of the pedicel. Calyx campanulate, the upper 2 lobes completely or partly fused, shorter than the lowermost lobe but longer than the laterals. Corolla papilionaceous, mostly violet-blue or purple; the standard obovate, short-clawed and auriculate; the wings auriculate, short-clawed, cohering to and a little longer than the straight or slightly curved, short-clawed and auriculate keel. Stamens monadelphous with the vexillary stamen free at base but attached to the staminal tube above or sometimes diadelphous with the vexillary stamen completely free. Ovary sessile to short-stipitate, style elongate and beardless. Legume elongate, compressed, continuous or septate between the few to several seeds, dehiscent.

A genus of about 12 species of eastern Asia. (Named in honor of M. N. Puerari (1766-1845), a Swiss botanist.)

1. *PUERARIA* *LOBATA* (Willd.) Ohwi, Bull. Tokyo Sci. Mus. no. 18. 16. 1947.

P. Thunbergiana (Sieb. & Zucc.) Benth., Jour. Linn. Soc. 9: 122. 1865.

Trailing or very high-climbing, perennial, woody vine with stems and branches often 10-30 m long and becoming 2.5 cm in diameter with densely long-villous new growth. Stipules ovate-lanceolate, the lower portion

more or less adnate to the stem, acute, mostly 8-12 mm long. Leaves pinnately 3-foliate; leaflets ovate-rhombic, ovate to more or less rotund, entire or deeply 2-3-lobed, abruptly tapering to an acuminate tip, pubescent beneath, about 0.5-1.2(2) dm long on petiolules about 3-10 mm long and with setaceous stipels about 5-9 mm long. Panicle axillary (0.5)1-2(3) dm long, the peduncle, rachis and pedicels all densely appressed, white, silky-pubescent with 1-several flowers borne at a node on pedicels about 2-6(8) mm long each subtended by a caducous, narrowly lanceolate, pubescent bract about 2-3 mm long and with a pair of linear-lanceolate to lanceolate, caducous, pubescent bractlets about 2-3 mm long at or near the top of the pedicel. Calyx densely appressed-pubescent; the tube campanulate, about 2-5-3.5 mm high; the lobes unequal, the upper 2 completely fused, about 5-7 mm long, the lateral triangular or lanceolate, acute, 3-5 mm long, the lowest linear-lanceolate, about 6-9(12) mm long. Petals violet-purple to reddish-purple, the standard about 1.5-2.5 cm long with a conspicuous yellow blotch near base of blade. Legumes linear-oblong, about 4-5 cm long, flattened, tawny to reddish-brown villous throughout.

DISTRIBUTION: The KUDZU was introduced from the Orient in the last century; it has been cultivated for forage and to prevent erosion and has now widely escaped and has become naturalized throughout much of the Southeast.

48. *AMPHICARPA* ELL., Jour. Acad. Nat. Sci. Phila. 1: 372. 1818. *nom. conserv.*
(as *Amphicarpa*.)

Falcata J. F. Gmel., Syst. Nat. ed. 13. 2: 1131. 1791.

Twining, perennial, herbaceous vines with alternate, pinnately compound leaves with 3 stipellate, petiolulate leaflets (or in some Asiatic species 1- or 5-foliate). Racemes from the axils of the upper leaves with pedicellate flowers subtended by persistent, conspicuous bracts; the basal flowers of raceme rarely apetalous or the petals greatly reduced. Racemes from the lower axils or on creeping branches at the base with petals lacking or with merely rudimentary petals and with free stamens; producing, often underground, small, 1-seeded fruits. Calyx of petaliferous flowers narrowly campanulate or cylindrical with 4 lobes (through the fusion of the upper 2 lobes) or rarely 5-lobed, almost equal in length. Corolla papilionaceous, red, violet, blue or white; standard erect, folded about the other petals, obovate to somewhat

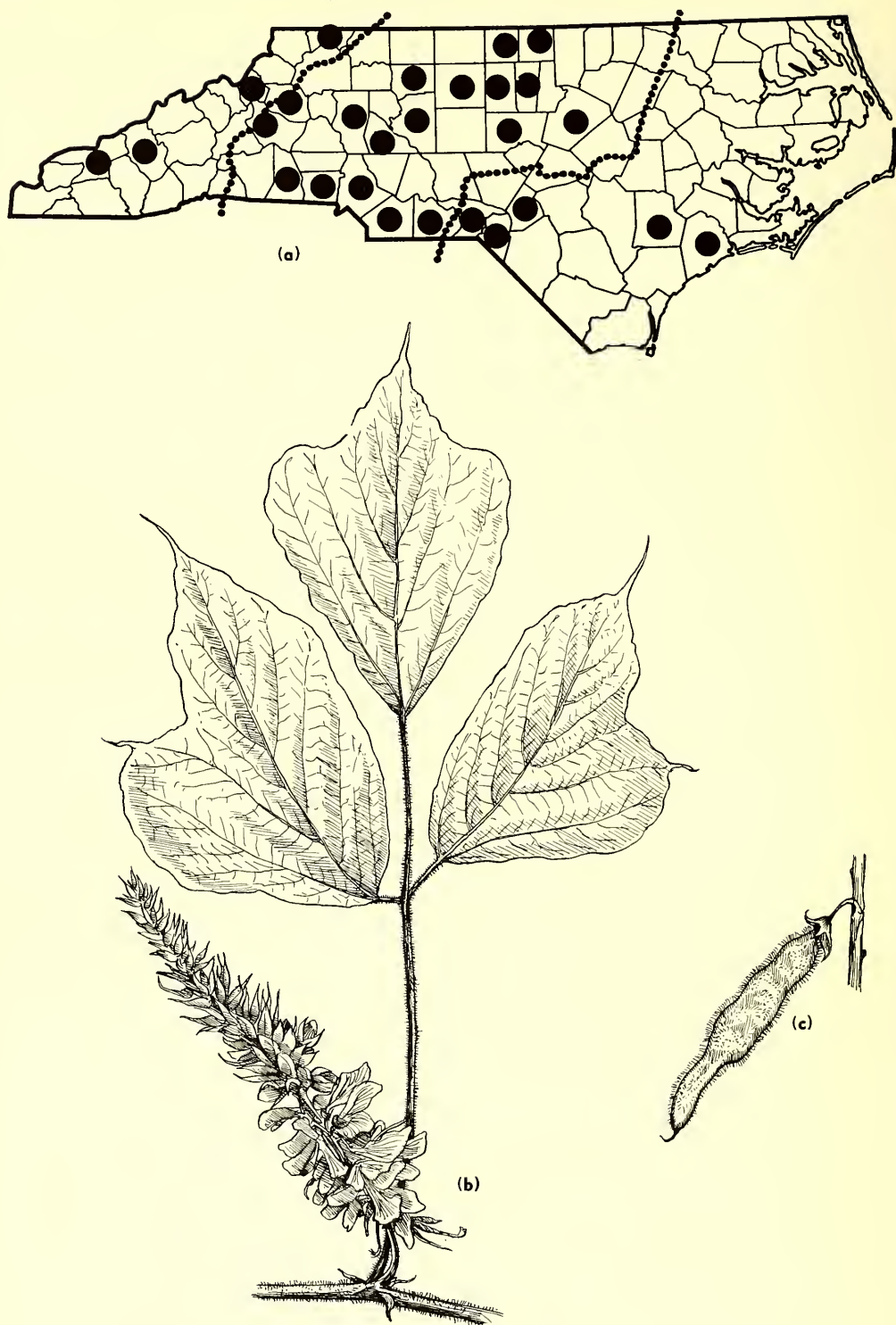


Fig. 137. *Pueraria lobata*. (a) Distribution; (b) Habit sketch; (c) Fruit.

oblong, tapering gradually to the base or above the base abruptly expanded into indistinct auricles; wings oblong, auricled and with a long claw; the keel-petals with elongate claw and loosely attached to each other and to the wings. Stamens of the petaliferous flowers diadelphous, 9 and 1. Ovary sessile or stipitate, style slender, filiform, not bearded. Legume of the petaliferous flowers linear-oblong, compressed, several-seeded, the valves coiling after dehiscing; those from the apetalous flowers fleshy, often subterranean, small, usually 1-seeded.

A genus of about 7 species of eastern North America and eastern Asia. (Name derived from the Greek *amphi*=both and *carpos*=fruit, in reference to the two kinds of fruit.)

Rickett and Stafleu (Taxon 8:296.1959) indicated that in the 1961 edition of the International Code, Elliott's genus would again appear in the list of Conserved Names in a form other than that originally published. The conserved form will be *Amphicarpaea*, the spelling first employed by DeCandolle in 1825. This change seems needless and, as it is direct contradiction with Article 73, one should feel no compulsion to take up the "conserved" spelling. The new combination, *Amphicarpaea bracteata* (L.) Rickett & Stafleu, seems totally unwarranted.

1. AMPHICARPA BRACTEATA (L.) Fern., Rhodora 35: 276. 1933.

Amphicarpaea bracteata (L.) Rick. & Stafleu, Taxon 8:296.1959.

Twining, climbing vine about 0.5-1(2) m long. Stipules ovate to ovate-lanceolate, striate, persistent, the median about 3-5 mm long. Petioles slender, mostly (1)2-7(9) cm long. Leaves pinnately 3-foliolate (or the lower occasionally 1-foliolate); leaflets with petiolules about 1-2 mm long and subtended by lanceolate to ovate-lanceolate, persistent stipels 1-1.5 mm long; the terminal leaflet mostly 2-8(10) cm long on a conspicuous rachis-stalk mostly 0.5-1.5 cm long, ovate to rhombic-ovate, acute (or rarely acuminate) to obtuse, broadly rounded at base; the lateral leaflets asymmetrical, somewhat smaller than the terminal. Racemes nodding, simple or branching with slender peduncles mostly 1-5 cm long with about (1)2-15(17) flowers each about 0.9-1.6 cm long on pedicels about 1.5-5 mm long subtended by persistent, striate, ovate, obtuse to truncate bracts about 2-3.5 mm long.

(Racemes of apetalous flowers slender, much-elongate, with widely separated, small inconspicuous flowers.) Calyx glabrous to densely appressed-pubescent; the tube cylindrical, 4-6 mm long and about 2 mm in diameter; the lobes triangular to lanceolate-subulate, about 1-2 mm long. Petals purple to pale lilac or white, 9-16 mm long with the standard somewhat longer than the wings and keel. Legume (aerial) oblong-linear, 1.5-4 cm long and about 7-10 mm wide with strigose sutures and glabrous to strigose valves.

DISTRIBUTION: Widespread throughout most of the eastern United States ranging from Nova Scotia and Quebec west to Manitoba and Montana and south to eastern Texas and northern Florida.

This species of HOG PEANUT has been most recently treated as being composed of two varieties whose ranges broadly overlap each other and whose morphological differences, which in the extreme forms are strongly pronounced, blend almost imperceptibly into one another. They have been separated by the following key-characteristics.

1. Stem capillary with closely reflexed short-pubescent; median stipules about 3 mm long; leaflets thin and minutely strigose on both surfaces, the terminal mostly 2-6(8) cm long; racemes 1-8(10)-flowered, usually unbranched; floral bracts 2-2.5 mm long; the lower exceeded by the pedicels; flowers 9-13 mm long; calyx-tube 4-5 mm long; blade of keel-petals longer than the claw; legumes 1.5-3 cm long, glabrous on the face, pubescence towards base of lower suture antrorse .. 1. *A. bracteata* var. *bracteata*.

1. Stem coarser with spreading villous pubescence; median stipules about 4-5 mm long; leaflets firm and densely and conspicuously pubescent, the terminal mostly 5-10 cm long; racemes 7-17-flowered, often branching; floral bracts 2.5-3.5 mm long, the lower exceeding the pedicels; flowers 11-16 mm long; calyx-tube 4.5-6 mm long; blade of keel-petals about equal to the claw; legumes 2-4 cm long, often with strigose faces, pubescence towards the base of the lower suture retrorse 2. *A. bracteata* var. *comosa*.

1. *Amphicarpa bracteata* var. *bracteata*
Amphicarpa monoica (L.) Ell., Jour. Acad. Nat. Sci. Phila. 1: 373. 1818.

Falcata comosa in the sense of Kuntze, Rev. Gen. 1: 182. 1891, not of the basionym.

2. *Amphicarpa bracteata* var. *comosa* (L.) Fern., *Rhodora* 39: 318. 1937.

Amphicarpa Pitcheri T. & G., Fl. N. Am. 1: 292. 1839.

Falcata Pitcheri (T. & G.) Kuntze, Rev. Gen. 1: 182. 1891.

Amphicarpa bracteata var. *Pitcheri* (T. & G.) Fassett, *Rhodora* 38: 95. 1936.

If the majority of the specimens belonging to this species could be separated by the characteristics included in the key above, then one would have few, if any, doubts as to the wisdom of recognizing them as two distinct entities. However, the numerous characteristics are anything but constant in themselves as the plants vary gradually from one extreme to the other and the characters attributed to the varieties fail to remain linked together. Hence numerous plants possess some characteristics of both of the so-called varieties. Fassett (*Rhodora* 38: 95-96. 1936) who was the first modern author to consider these plants as belonging to but one species composed of two varieties made the following admissions: "... it is difficult to find a specimen which can be identified as one species or the other by all of these characters, and there is not sufficient correlation among any of them to warrant specific differentiation. Indeed not one of these characters is of a clean-cut qualitative nature; var. *Pitcheri* is simply a vigorous, coarser, more villous form of *A. bracteata*. The ranges of the two are almost identical..." It seems impossible to separate objectively into two groups specimens belonging to this species. The extremes are striking but the intermediates are so abundant as to convince one of the futility of attempting to distinguish formally subspecific taxa within this species.

49. GALACTIA P. Br., Hist. Jam. 298. 1756.

Prostrate or twining, climbing, herbaceous or woody vines or erect, perennial herbs or rarely shrubs with stipulate, pinnately compound, usually 3-foliolate (or less commonly 1-, 5-, or 7-foliolate) leaves and with petiolulate, stipellate leaflets. Racemes axillary with a short- to much-elongated peduncle and rachis with few to numerous flowers borne solitary or in clusters of 2-several each on a pedicel

subtended by a small bract and with a pair of bractlets at or near the top of the pedicel. Calyx regular with a campanulate to obconic tube and apparently 4 lobes (the upper 2 fused), the upper usually slightly longer than the laterals, the lowermost the longest. Corolla papilionaceous; the petals usually purple, red, pink or white; the standard obovate to orbicular with a short claw and obscure to conspicuous auricles; wing-petals oblong or obovate, clawed and often auriculate, shorter than the standard and about equal to or somewhat shorter than the straight or slightly incurved keel. Stamens diadelphous with the vexillary stamen free or (in many foreign species) somewhat monadelphous with the vexillary stamen united in the middle with the staminal tube. Ovary sessile or very shortly stalked. Legume oblong-linear to linear, few- to many-seeded, compressed, straight or slightly curved, dehiscent with the valves often becoming twisted.

A genus of perhaps 90 species of the tropic and temperate regions of both hemispheres found on all continents except Europe but most abundant in the Americas. (Name derived from the Greek *gala* = milk, as the author, Patrick Browne, stated that the branches of the species he was describing yielded a milky juice when broken.)

1. Stems erect; rachis-stalk of the terminal leaflet always 2 mm long or less; raceme always less than 3 cm long .. 1. *G. erecta*.
1. Stems trailing or prostrate, or climbing, twining vines; rachis-stalk of the terminal leaflet 2-8(20) mm long, at least some of them 4 mm long or more; racemes (or at least some of them) 3-10 cm long or more.
2. Ovary densely white-hirsute; legume densely tomentose; leaflets mostly spreading pilose or villous on both surfaces; calyx densely villous; petals bright red or rose-purple 2. *G. mollis*.
2. Ovary strigose to short-pubescent; legume minutely strigillose to spreading or appressed short-pubescent; leaflets glabrous or nearly so on both surfaces or glabrate or nearly so above and appressed strigose to spreading short-pubescent beneath; calyx glabrous, or appressed to spreading short-pubescent; petals pink to purple.
3. Stems prostrate or rarely twining (and then usually only at the tip); standard 1.2-1.8 cm long and the keel-petals 1-1.4 cm long 3. *G. regularis*.

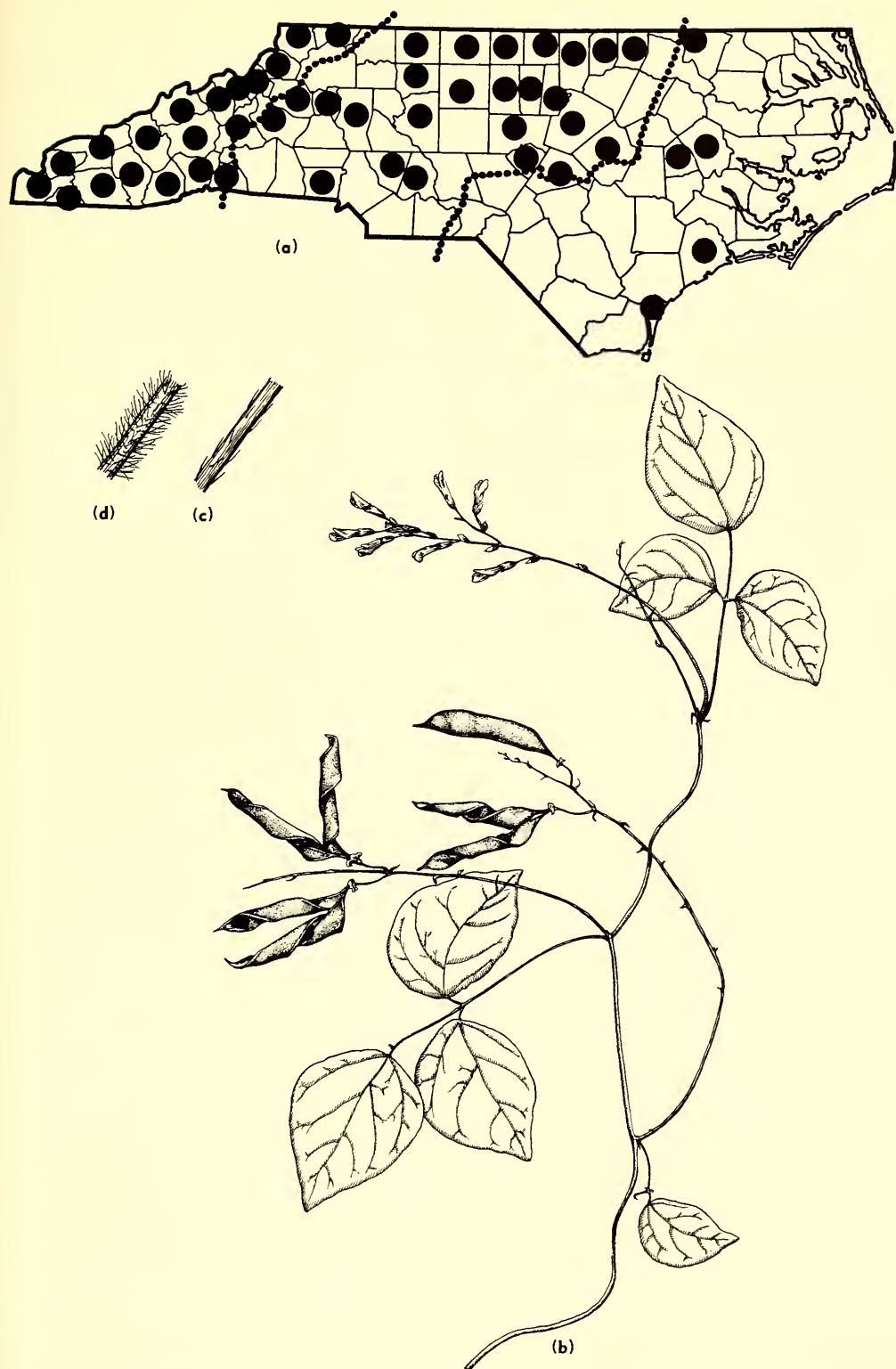


Fig. 138. *Amphicarpa bracteata*. (a) Distribution; (b) Habit sketch; (c) Enlarged section of stem of bracteata-phase; (d) Enlarged section of stem of comosa-phase.

3. Stems climbing and twining; standard 0.7-1.4 cm long and the keel about 6-10 mm long.

4. Stems, peduncles and rachises spreading short-pubescent or pilose; calyx with spreading short-pubescent; legume densely covered with spreading short-pubescent 4. *G. volubilis*.

4. Stems, peduncles and rachises minutely retrorse-strigillose (i.e. retrorsely appressed short-pubescent); calyx glabrate to appressed short-pubescent 5. *G. Macraei*.

1. *GALACTIA ERECTA* (Walt.) Vail,
Bull. Torrey Club 22: 502. 1895.

Perennial herb with a slender, elongate, woody, often fusiform root and 1-several, erect or commonly zig-zag or geniculate, slender, glabrous or very sparsely pubescent stems mostly (1)2-3(4) dm high. Stipules setaceous to linear-subulate, persistent but soon turning brown, about 1.5-3.5 mm long. Petioles slender, erect or ascendent, glabrous to very sparsely short-pubescent at base or apex, mostly (1)2.5-5(7) cm long. Leaves few and relatively remote with 3-foliate, obscurely pinnately arranged leaflets mostly linear-oblong to oblong or less commonly elliptic or linear, with a broadly rounded or obtuse, sometimes retuse, mucronulate or rarely acute apex and a broadly rounded or obtuse base, glabrous on both surfaces and conspicuously reticulate, coriaceous, (1.5)2.5-4(5) cm long and about 0.7-1.8 cm wide, with short-pubescent petiolules about 1-1.5 mm long and usually at least the lateral leaflets with a setaceous stipel 1-1.5(2) mm long and the rachis-stalk of the terminal leaflet very short and obscure, about 0.5-1.5(2) mm long. Racemes axillary, mostly 1-1.5(2) cm long, very obscurely peduncled, appearing subsessile with about 1-6-fascicled flowers on short-pubescent pedicels about (1)2-3 mm long subtended by triangular-subulate bracts about 1-1.5 mm long and with a pair of closely appressed triangular- to linear-subulate bractlets 1-2 mm long. Calyx appressed short-pubescent throughout, brownish, the tube obconic or turbinate, about 2-3 mm long, the lobes almost equal, (2)2.5-3 mm long, erect. Petals pale purple to white; the standard ovate to almost orbicular, about 7-8 mm long, with notched apex and clawed base. Ovary densely white-hirsute. Legume oblong-linear, about 2-4 cm long and 5-8 mm wide, 6-10-seeded, the valves and sutures pubescent.

DISTRIBUTION: Coastal Plain from southeastern North Carolina to northern Florida and west to Louisiana.

2. *GALACTIA MOLLIS* Michx., Fl. Bor.
Am. 2: 61. 1803.

Perennial, vine-like herb from a slender to thick, woody taproot with few to several, usually decumbent, twining, climbing, or even ascending, simple or more commonly branched stems up to at least 1 m long and more or less spreading short-pubescent throughout. Stipules narrowly triangular to linear-subulate, persistent but soon turning brown, about (1)2-3 mm long. Petioles mostly 2-5 cm long, densely spreading short-pubescent. Leaves pinnately 3-foliate, the rachis-stalk of the terminal leaflet densely spreading short-pubescent, about 2-8 mm long; leaflets narrowly to broadly oblong to elliptic or oval, apiculate, broadly rounded to obtuse, and often emarginate at apex, and broadly rounded to obtuse or sometimes weakly cordate at base, mostly (2)2.5-4(5) cm long and 1-3 cm wide or usually between $\frac{1}{4}$ and $\frac{2}{3}$ as broad as long, more or less spreading pilose or villous on both surfaces or with age becoming somewhat scabridulous, with densely spreading-pubescent petiolules mostly 1-2 mm long and setaceous stipels about 0.6-1 mm long. Racemes axillary, usually elongate, mostly (0.3)1-2 dm long with both peduncle and rachis densely pilose and with the flowers in clusters of 1-3 usually closely arranged near the top of the raceme above the elongate peduncle; flowers on spreading-pubescent pedicels about 1-3 mm long subtended by linear-subulate, densely pilose bracts about 2 mm long and with a pair of linear-subulate to triangular, densely pilose bractlets about 1-2 mm long at or near the top of each pedicel. Calyx densely villous, the tube about 1.8-2.5 mm long, the lobes almost equaling one another in length, about 3-4.5 mm long, acute, the upper lobe broader than the lower three. Petals bright red or rose-purple, the standard obovate, about 7-8(9) mm long. Ovary densely white-hirsute. Legume linear-oblong, about 2.5-3.5(4) cm long and 4.5-5.5 mm wide, densely tomentose.

DISTRIBUTION: Coastal Plain from North Carolina to Florida.

3. *GALACTIA REGULARIS* (L.) BSP.,
Prel. Cat. N. Y. 14. 1888.

Perennial herb from a thick-cylindrical to often carrot-shaped, woody root, often branched below, commonly 1.5-4 dm long or

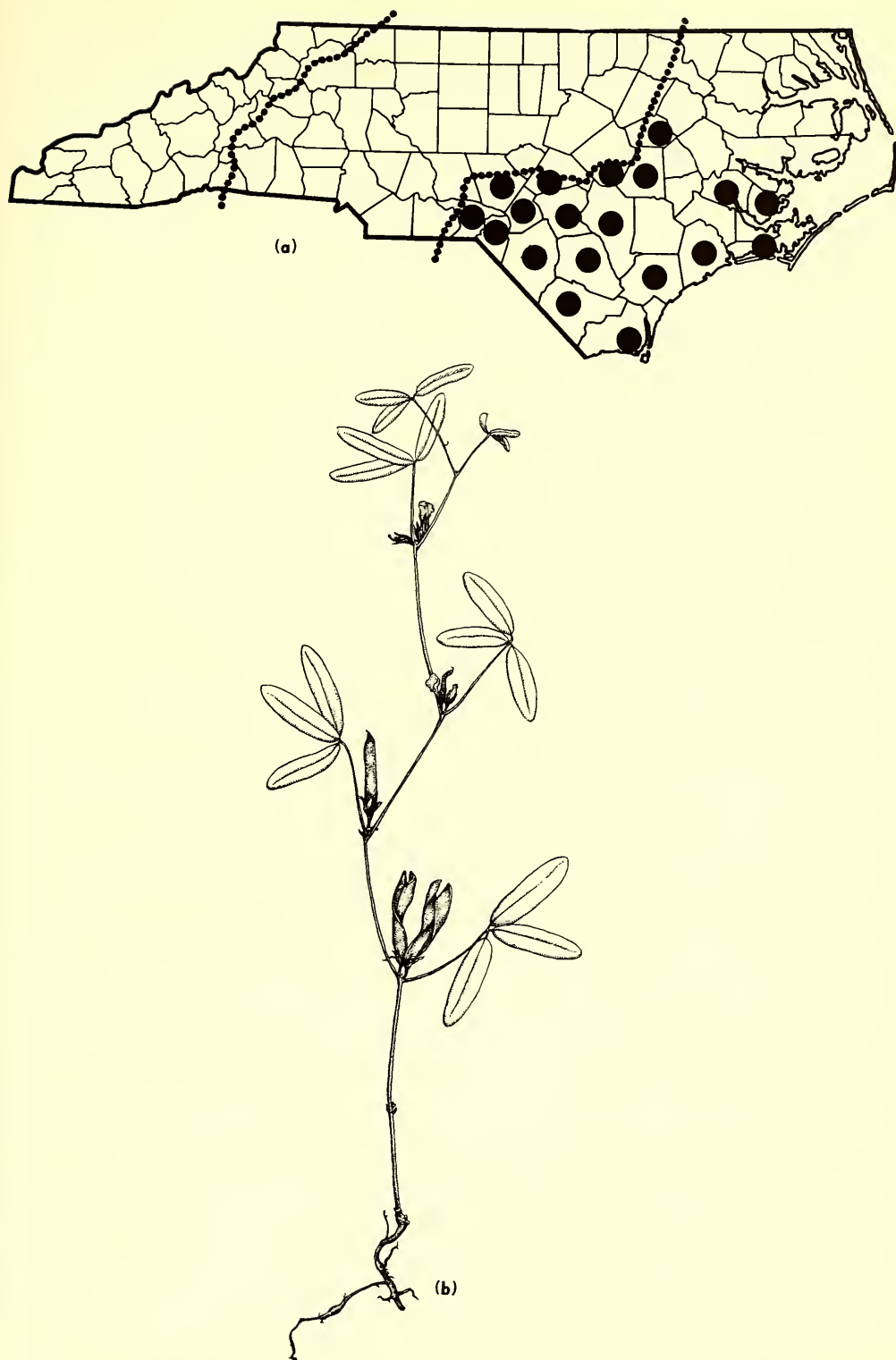


Fig. 139. *Galactia erecta*. (a) Distribution; (b) Habit sketch.

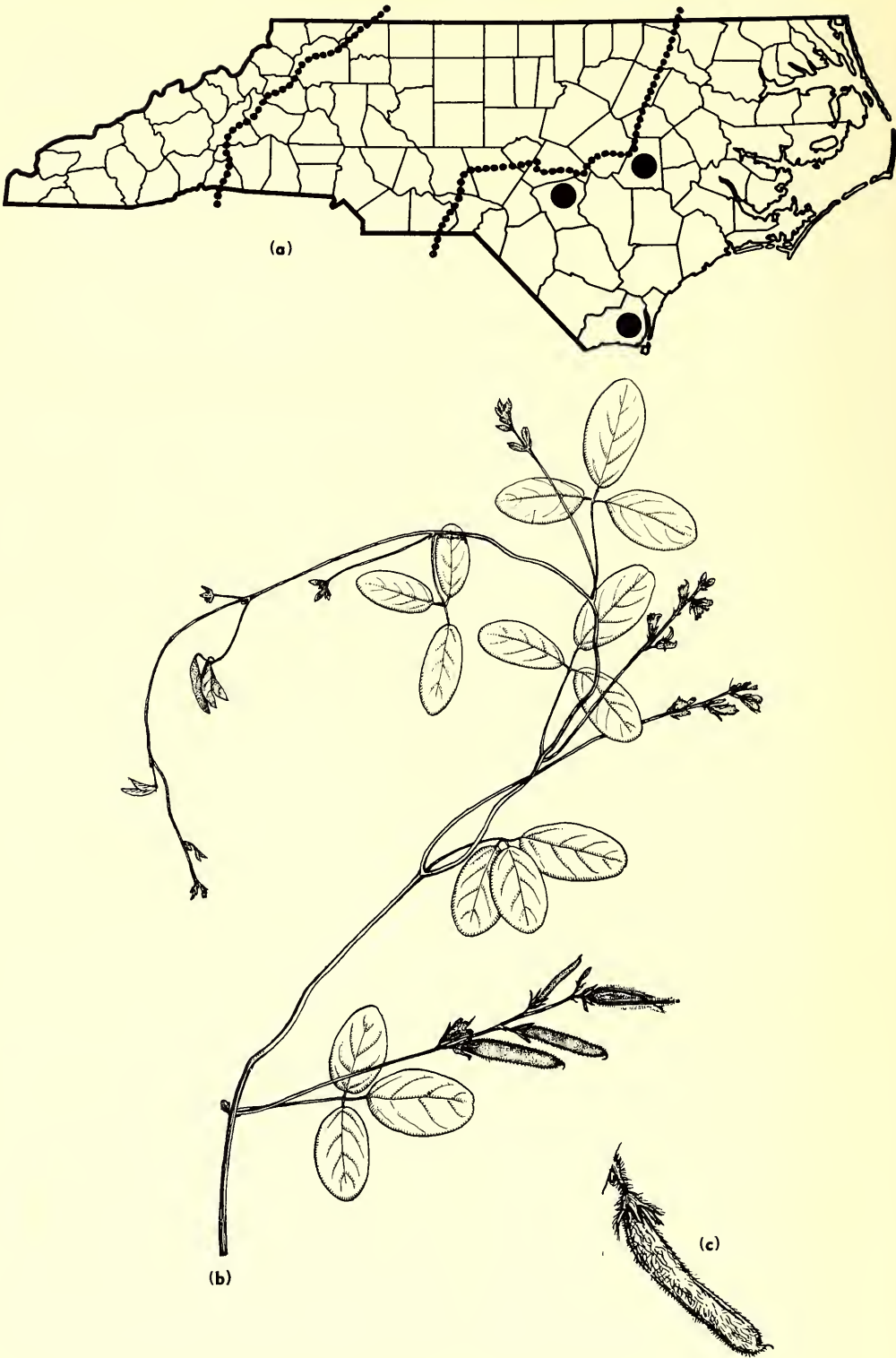


Fig. 140. *Galactia mollis*. (a) Distribution; (b) Habit sketch; (c) Fruit.

more and 0.5-1.5 cm in diameter with few to numerous stems arising from the much-branched crown. Stems usually trailing, procumbent, straight or twining only at the tip or more rarely ascendent, branching mostly restricted at the base, mostly 4-10 dm long, minutely appressed-pubescent to glabrate. Stipules linear-subulate to setaceous, about 1-3 mm long, persistent but soon turning brown. Petioles short, stiff, about (0.7) 1-3(4) cm long. Leaves pinnately 3-foliolate, the rachis-stalk of terminal leaflet mostly (0.3) 0.5-1.2(1.8) cm long; leaflets oblong, elliptic-oblong, elliptic or oblong-lanceolate with broadly rounded base and a broadly rounded to obtuse, often emarginate, mucronulate (but only rarely acute) apex, glabrous or very nearly so above, glabrous to appressed-pubescent beneath, mostly (1.2) 2-3.5(5) cm long and about (0.5) 1-2(3) cm wide with short-pubescent petiolules about 1-2(3) mm long and with setaceous stipels about 0.5-1 mm long. Racemes axillary, short to greatly elongate, 1-several from the floriferous axils, the glabrate to appressed short-pubescent peduncles and rachises about (1) 3-9(13) cm long, with few to many flowers on puberulent pedicels mostly (1) 2-4(5) mm long subtended by ovate or triangular-subulate, deciduous bracts about 1 mm long and with a pair of triangular to linear-subulate bractlets about 0.8-1.5(3) mm long at or near the top of the pedicel. Calyx glabrous to slightly appressed short-pubescent, the tube (2) 2.5-3.5 mm high, the lobes triangular to lanceolate, acute, about 3-5(6) mm long. Petals reddish-purple, the standard 1.2-1.8 cm long, the keel-petals about 1-1.4 cm long. Ovary densely white-strigose. Legume oblong-linear, densely appressed-pubescent, about (2) 2.5-4(5) cm long and about 4-5 mm wide.

DISTRIBUTION: Coastal Plain from southeastern New York and New Jersey south to Florida and west to Mississippi (or Louisiana?); reported from Tennessee, Missouri and Kansas.

4. *GALACTIA VOLUBILIS* (L.) Britt.,
Mem. Torrey Club 5: 208. 1894.

Galactia mississippiensis in the sense of Rogers, (unpublished dissertation, Duke University.)

Perennial, herbaceous vine from a somewhat carrot-shaped, occasionally branching taproot apparently mostly 0.5-1(1.5) dm long and 0.5-1 cm in diameter with several to numer-

ous, slender, twining, climbing (rarely trailing) branching stems up to 1-1.5 m long or more and the pubescence sparse to more commonly dense and spreading to slightly reflexed but never closely appressed and the trichomes short to pilose. Stipules triangular to linear-subulate or even setaceous, about 1-2 mm long. Petioles densely short-pubescent with spreading or at least not closely appressed hairs to rarely sparsely pubescent, slender, straight, mostly about 1-3(5) cm long. Leaves pinnately 3-foliolate, the rachis-stalk of the terminal leaflet densely spreading or ascendent, short-pubescent or occasionally glabrate, about 0.2-1(1.8) cm long; leaflets mostly narrowly to broadly oblong, oblong-ovate or elliptic with an obtuse to broadly rounded or even cordate base and mucronulate, broadly rounded or obtuse, occasionally emarginate or rarely somewhat acute apex, glabrous or nearly so above, appressed short-pubescent to spreading pilose beneath to rarely glabrate or very nearly so, about (1) 2-4(6) cm long and mostly 1-2.5(3.5) cm wide with wrinkled petiolules about 1-2(3) mm long and setaceous stipels about 0.2-0.6(1) mm long. Racemes axillary, the peduncles and rachises sparsely to densely spreading short-pubescent and the peduncle often 1.0-3.5 cm long in the typical racemes or occasionally about 3-15 cm long (but much longer in the rarely greatly elongate racemes and then up to 3 dm long) with flowers in clusters of 1-3 about 0.5-2 cm apart on spreading short-pubescent pedicels about (1) 2-3(4) mm long subtended by triangular, deciduous bracts about 0.4-0.8(1.2) mm long and with a pair of broadly triangular, acute bracts about 0.4-1 mm long near or at the top of the pedicel. Calyx with spreading, short pubescence; the tube about 2-2.5 mm high, the lobes lanceolate, about 2-3.5 mm long. Petals pink to roseate; the standard about 7-10 mm long, the keel-petals 6-9(10) mm long. Legume linear, 2-5.5 cm long and 4-5 mm wide and densely covered with spreading, short pubescence.

DISTRIBUTION: Long Island to Missouri and southeastern Kansas south to Florida and eastern Texas.

This species has been confused in the past with the coastal plain *G. Macreei*. The confusion in nomenclature and the differing concepts are explained somewhat more fully under *G. Macreei*. Both of these species are more puzzling than has been recognized and further study is required.

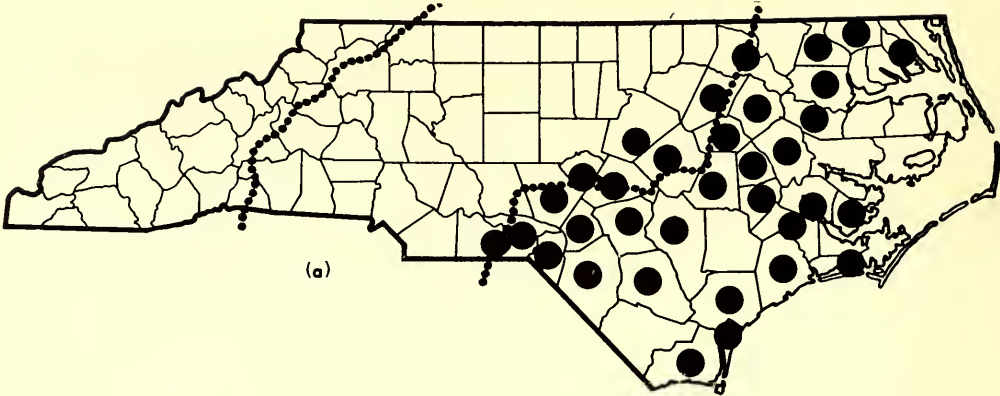


Fig. 141. *Galactia regularis*. (a) Distribution; (b) Habit sketch.

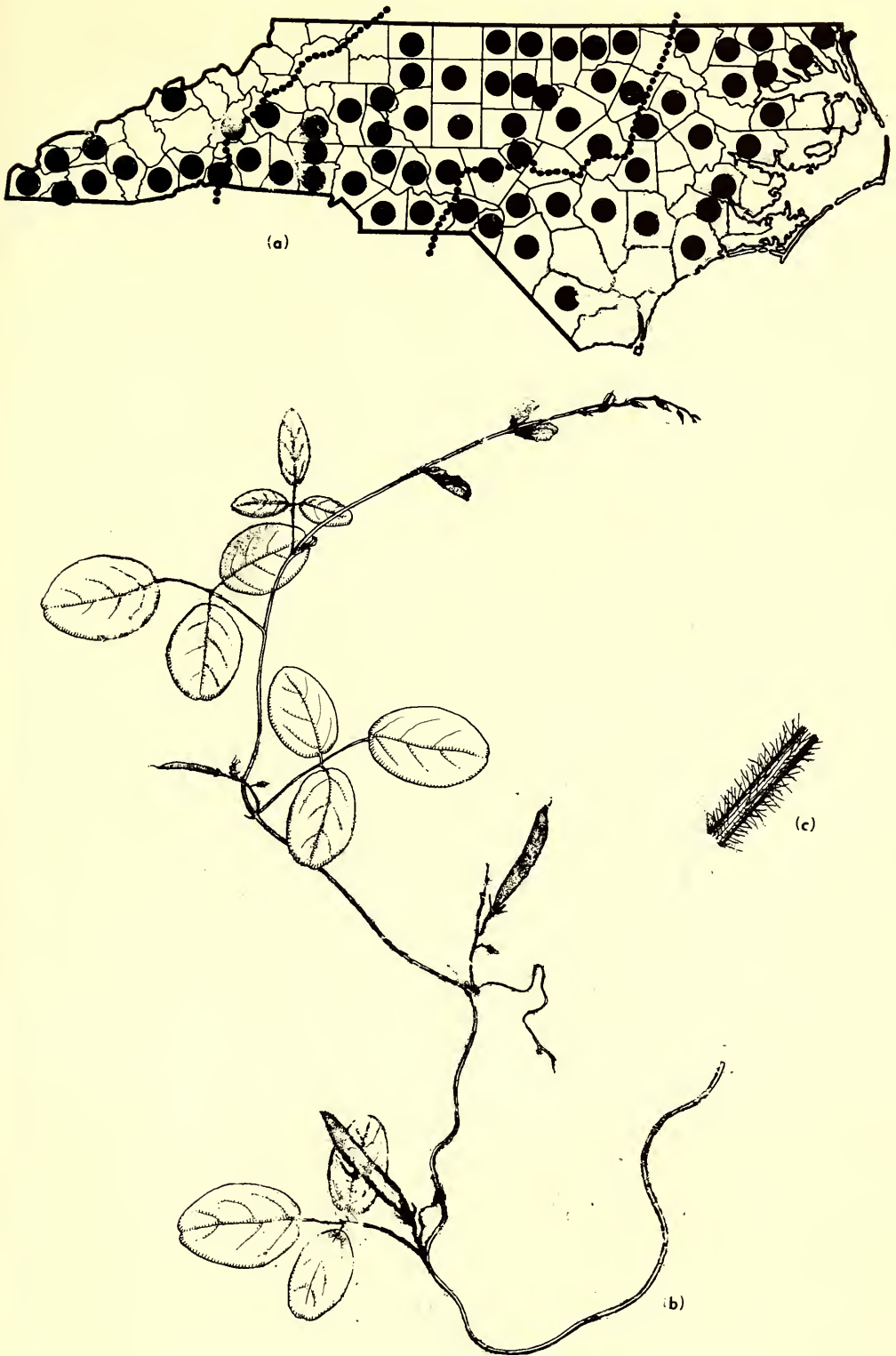


Fig. 142. *Galactia volubilis*. (a) Distribution; (b) Habit sketch; (c) Enlarged section of stem.

5. *GALACTIA MACREEI* M. A. Curtis,
Bost. Jour. Nat. Hist. 1: 120. 1837.

Galactia volubilis in part of Vail and most authors or completely in the sense of H. J. Rogers (Mss., Duke University.)

Perennial, herbaceous vine from a slender, carrot-shaped, occasionally fusiform, sometimes branching, woody taproot usually 0.5-1.5 dm long and 0.5-1 cm in diameter with several to numerous, filiform to slender, twining, climbing (rarely trailing), branching stems up to 1-1.5 m long or more and minutely retrorse-strigillose (very shortly appressed-pubescent) to glabrate. Stipules setaceous, persistent, short-pubescent, brown, about 1-2 mm long. Petioles slender, minutely appressed short-pubescent to glabrate, mostly (1)2-4(5) cm long. Leaves pinnately 3-foliolate, the rachis stalk of the terminal leaflet short, appressed-pubescent, about 2-8(12) mm long; leaflets mostly oblong, oblong-linear to oblong-ovate but varying and sometimes oblong-lanceolate, elliptic to almost oval, with usually a broadly rounded or obtuse but occasionally somewhat cordate base and a broadly rounded, obtuse or truncate, often emarginate, mucronulate apex, glabrous or very nearly so above and appressed short-pubescent or more rarely glabrate below, about (1)2-4(5) cm long and 0.5-2 cm wide or about (1.5)2-4(5)-times as long as wide, with wrinkle' short-pubescent petiolules about 1-2 mm long and with setaceous stipels about 0.2-0.6(1) mm long. Racemes axillary, slender to filiform, usually flexuous, mostly retrorsely appressed short-pubescent (i.e. retrorsely strigillose) to less commonly glabrous, the poorly developed racemes, subsessile and few-flowered, while in the better developed inflorescences about 0.5-2.5(4.5) dm long with a peduncle about 3-7 cm long or generally about $\frac{1}{4}$ - $\frac{1}{2}$ the length with floriferous nodes well-separated (the internodes often 1.5-4 cm long) and with flowers solitary or commonly in fascicles of 2-3 on usually retrorsely appressed short-pubescent pedicels about 1-3 mm long subtended by a caducous, triangular, acute bract about 0.5-1 mm long

and with a pair of broadly to narrowly triangular or lance-subulate or even ovate bractlets about 1 mm long at or near the top of the pedicel. Calyx more or less appressed short-pubescent to glabrate; the tube mostly 2-2.5(3) mm long, the lobes lanceolate and mostly 4-5(6) mm long. Corolla pink with deep purple center or purple; the standard about 1-1.4 mm long, the keel-petals about 9-10 mm long. Legume linear, about (3)4-6(7) cm long, and 5 mm wide, with appressed short-pubescent.

DISTRIBUTION: Coastal Plain from southeastern Virginia into peninsular Florida and west to eastern Texas.

The nomenclature of this species and the one here called *G. volubilis* is perplexing. The names tentatively accepted here are those adopted by Fernald. Rogers (unpublished dissertation, Duke University) in his revision of the genus occurring in the United States claimed that the type of *G. volubilis* matches the coastal plants here called *G. Macreei* and calls the more abundant and widely distributed species (here called *G. volubilis*) *G. mississippiensis* (Vail) Rydb., a plant which, when originally described, was restricted morphologically to specimens with leaflets pilose on the upper surface as well as below and geographically was thought to be restricted to the Mississippi Valley. The plate of Dillenius which Rogers considered to be the type of *G. volubilis* shows widely spreading, conspicuous pubescence which contrasts greatly with the strigillose, macroscopically invisible pubescence of the plant to which Rogers refers the name. Rogers arrived at a different conclusion upon studying this same plate. Gleason (1952, 2: 451) combines *G. Macreei* and *G. volubilis*, but on the basis of the material that I have seen they seem to be readily distinguishable.

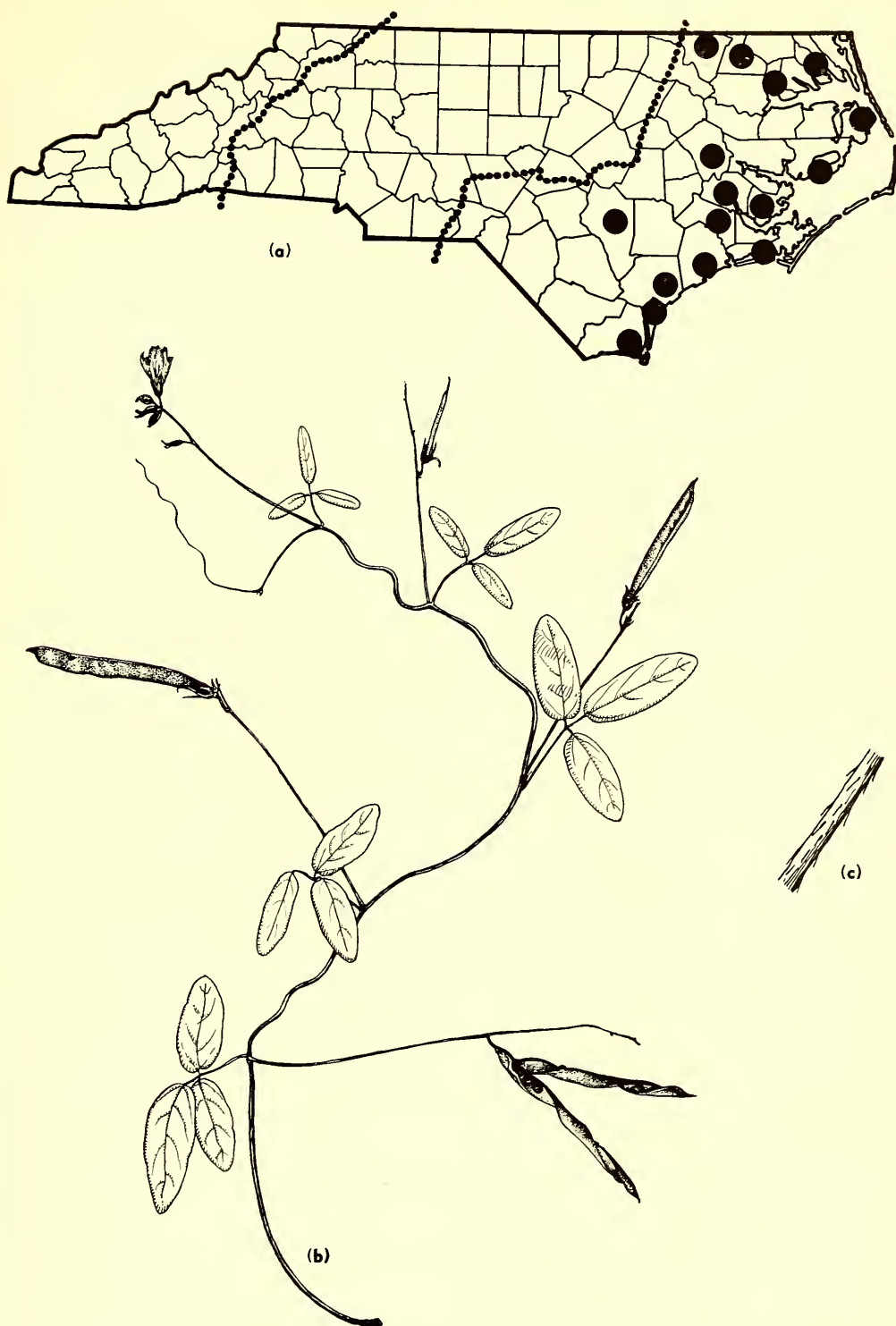


Fig. 143. *Galactia Macreei*. (a) Distribution; (b) Habit sketch; (c) Enlarged section of stem.

Chromosome Numbers

In spite of the desirability of such information, no attempt was made to secure chromosome counts during the course of this study. It is hoped that assembling the published accounts in this appendix might stimulate others to investigate unreported taxa and in this way augment the counts now known in the family which were estimated by Turner (1956) to be reported upon for approximately 8 per cent of the species and 26 per cent of the genera. The present summary was compiled from Darlington and Wylie (1956), Cave (1958—), Turner (1959) or in a few cases from

papers cited by them. Surprisingly enough 68 per cent of our species have had their chromosome numbers counted.

In all cases the numbers listed here are of the somatic, unreduced, or sporophytic number regardless of how they were originally reported.

The abbreviations or formulae employed are readily interpreted. That for *Albizia* reading "x = 13 on 8/60 spp." meaning that the base number is 13 on the 8 species counted in this genus of approximately 60 species.

Mimosoideae

- | | |
|--------------------------|------------------------|
| 1. ALBIZIA | x = 13 on 8/60 spp. |
| 1. <i>A. julibrissin</i> | 2n = 26, 52. |
| 2. SCHRANKIA | x = 8, 13 on 5/25 spp. |
| 1. <i>S. microphylla</i> | 2n = 16. |

Caesalpinoideae

- | | |
|---------------------------|-------------------------------|
| 3. CERCIS | x = 7 on 3/8 spp. |
| 1. <i>C. canadensis</i> | 2n = 14. |
| 4. CASSIA | x = 7 (6,8,13) on 90/500 spp. |
| 1. <i>C. obtusifolia</i> | 2n = 28. |
| 2. <i>C. occidentalis</i> | 2n = 28. |
| 3. <i>C. hebecarpa</i> | 2n = unreported. |
| 4. <i>C. marilandica</i> | 2n = 28. |
| 5. <i>C. fasciculata</i> | 2n = 16. |
| 6. <i>C. nictitans</i> | 2n = 16. |
| 5. GLYMNOCLADUS | x = 14 on 1/2 spp. |
| 1. <i>G. dioica</i> | 2n = 28. |
| 6. GLEDITSIA | x = 14 on 7/12 spp. |
| 1. <i>G. triacanthos</i> | 2n = 28. |
| 2. <i>G. aquatica</i> | 2n = 28. |

Papilionoideae

- | | |
|------------------------|--------------------|
| 7. CLADRASTUS | x = 14 on 1/4 spp. |
| 1. <i>C. lutea</i> | 2n = 28. |
| 8. BAPTISIA | x = 9 on 7/30 spp. |
| 1. <i>B. australis</i> | 2n = 18. |
| 2. <i>B. cinerea</i> | 2n = unreported. |
| 3. <i>B. bracteata</i> | 2n = unreported. |
| 4. <i>B. tinctoria</i> | 2n = 18. |
| 5. <i>B. Serenae</i> | 2n = unreported. |
| 6. <i>B. alba</i> | 2n = unreported. |
| 7. <i>B. pendula</i> | 2n = unreported. |

9. THERMOPSIS
 1. *T. villosa* $x = 9$ on 2/20 spp.
 $2n =$ unreported.
 2. *T. mollis* $2n =$ unreported.
 3. *T. fraxinifolia* $2n =$ unreported.
10. CROTALARIA
 1. *C. Purshii* $x = 7,8$ on 40/300 spp.
 $2n =$ unreported.
 2. *C. angulata* $2n =$ unreported.
 3. *C. sagittalis* $2n = 32$.
 4. *C. spectabilis* $2n =$ unreported.
 5. *C. retusa* $2n = 16$.
 6. *C. mucronata* $2n = 16$.
 7. *C. intermedia* $2n =$ unreported.
11. LUPINUS
 1. *L. perennis* $x = 12$ on 20/250 spp.
 $2n = 24$.
 2. *L. diffusus* $2n =$ unreported.
 3. *L. villosus* $2n =$ unreported.
12. CYTISUS
 1. *C. scoparius* $x = 11, 12 (13)$ on 21/75 spp.
 $2n =$ unreported.
13. TRIFOLIUM
 1. *T. resupinatum* $x = 6,7,8,9$ on 40/300 spp.
 $2n = 16$.
 2. *T. lappaceum* $2n = 16$.
 3. *T. arvense* $2n = 14$.
 4. *T. incarnatum* $2n = 14$.
 5. *T. pratense* $2n = 14 (28)$.
 6. *T. hirtum* $2n =$ unreported.
 7. *T. striatum* $2n = 14$.
 8. *T. repens* $2n = 32,48,64$.
 9. *T. hybridum* $2n = 16$.
 10. *T. reflexum* $2n = 16$.
 11. *T. carolinianum* $2n =$ unreported.
 12. *T. agrarium* $2n =$ unreported.
 13. *T. campestre* $2n = 14$.
 14. *T. dubium* $2n = 14,28,16$.
14. MELILOTUS
 1. *M. indica* $x = 8$ on 14/20 spp.
 $2n = 16$.
 2. *M. officinalis* $2n = 16$.
 3. *M. alba* $2n = 16,24,32$.
15. MEDICAGO
 1. *M. sativa* $x = 8 (or 7?)$ on 40/100 spp.
 $2n = 16,32,64$.
 2. *M. orbicularis* $2n = 16$.
 3. *M. lupulina* $2n = 16,32$.
 4. *M. arabica* $2n = 16$.
 5. *M. minima* $2n = 16$.
 6. *M. polymorpha* $2n = 14,16$.
16. LOTUS
 1. *L. Helleri* $x = 6,7$ on 8/140 spp.
 $2n =$ unreported.
 2. *L. corniculatus* $2n = 12,24$
17. AMORPHA
 1. *A. herbacea* $x = 10$ on 4/20 spp.
 $2n =$ unreported.
 2. *A. Schwerini* $2n =$ unreported.
 3. *A. cyanostachya* $2n =$ unreported.
 4. *A. glabra* $2n =$ unreported.
 5. *A. fruticosa* $2n = 40$.
18. PSORALEA
 1. *P. lupinellus* $x = 10,11$ on 12/120 spp.
 $2n =$ unreported.
 2. *P. macrophylla* $2n =$ unreported.
 3. *P. Onobrychis* $2n =$ unreported.

- | | |
|-----------------------------|---------------------------------|
| 4. <i>P. psoralioides</i> | 2n = unreported. |
| 5. <i>P. canescens</i> | 2n = unreported. |
| 19. PETALOSTEMON | x = 7 on 7/40 spp. |
| 1. <i>P. pinnatum</i> | 2n = unreported. |
| 20. AESCHYNOMENE | x = 10 on 2/100 spp. |
| 1. <i>Ae. virginica</i> | 2n = 40. |
| 2. <i>Ae. indica</i> | 2n = 40. |
| 21. CORONILLA | x = 6 on 2/20 spp. |
| 1. <i>C. varia</i> | 2n = 24. |
| 22. ZORNIA | x = 10 on 1/20 spp. |
| 1. <i>Z. bracteata</i> | 2n = 20. |
| 23. ARACHIS | x = 10 on 9/10+ spp. |
| 1. <i>A. hypogaea</i> | 2n = 40. |
| 24. STYLOSANTHES | x = 10 on 2/20 spp. |
| 1. <i>S. biflora</i> | 2n = unreported |
| 25. DESMODIUM | x = 11 on 22/200 spp. |
| 1. <i>D. nudiflorum</i> | 2n = 22. |
| 2. <i>D. glutinosum</i> | 2n = 22. |
| 3. <i>D. pauciflorum</i> | 2n = unreported |
| 4. <i>D. rotundifolium</i> | 2n = 22. |
| 5. <i>D. ochroleucum</i> | 2n = unreported |
| 6. <i>D. canescens</i> | 2n = 22. |
| 7. <i>D. cuspidatum</i> | 2n = unreported |
| 8. <i>D. lineatum</i> | 2n = unreported |
| 9. <i>D. viridiflorum</i> | 2n = 22. |
| 10. <i>D. Nuttallii</i> | 2n = unreported |
| 11. <i>D. tortuosum</i> | 2n = 22. |
| 12. <i>D. sessilifolium</i> | 2n = 22. |
| 13. <i>D. tenuifolium</i> | 2n = unreported |
| 14. <i>D. strictum</i> | 2n = unreported |
| 15. <i>D. ciliare</i> | 2n = 22. |
| 16. <i>D. marilandicum</i> | 2n = 22. |
| 17. <i>D. obtusum</i> | 2n = 22 (as <i>D. rigidum</i>) |
| 18. <i>D. paniculatum</i> | 2n = 22. |
| 19. <i>D. laevigatum</i> | 2n = 22. |
| 20. <i>D. Fernaldii</i> | 2n = unreported. |
| 21. <i>D. glabellum</i> | 2n = 22. |
| 22. <i>D. perplexum</i> | 2n = unreported. |
| 26. LESPEDEZA | x = 9,10,11 on 24/90 spp. |
| 1. <i>L. procumbens</i> | 2n = 20. |
| 2. <i>L. repens</i> | 2n = 20. |
| 3. <i>L. bicolor</i> | 2n = 22. |
| 4. <i>L. Nuttallii</i> | 2n = 20. |
| 5. <i>L. Steuvei</i> | 2n = 20. |
| 6. <i>L. intermedia</i> | 2n = 20. |
| 7. <i>L. virginica</i> | 2n = 20. |
| 8. <i>L. cuneata</i> | 2n = 18. |
| 9. <i>L. hirta</i> | 2n = 20. |
| 10. <i>L. capitata</i> | 2n = 20. |
| 11. <i>L. angustifolia</i> | 2n = unreported. |
| 12. <i>L. stipulacea</i> | 2n = 22. |
| 13. <i>L. striata</i> | 2n = 22. |
| 27. SESBANIA | x = 6 on 7/30 spp. |
| 1. <i>S. exaltata</i> | 2n = 12. |
| 28. GLOTTIDIUM | 2n = 12. |
| 1. <i>G. vesicaria</i> | x = 6 on 1/1. |

29. DAUBENTONIA x = 6 on 2/5.
2n = 12.
1. *D. punicea*
30. WISTERIA x = 8 on 5/8 spp.
2n = 16.
2n = 16.
2n = 16.
1. *W. frutescens*
2. *W. sinensis*
3. *W. floribunda*
31. ROBINIA x = 10 on 8/20? spp.
2n = 20.
2n = 20.
2n = 20.
2n = 20,30.
2n = unreported.
2n = unreported.
2n = 30.
2n = 20.
1. *R. Pseudo-Acacia*
2. *R. viscosa*
3. *R. Hartwigii*
4. *R. hispida*
5. *R. Elliottii*
6. *R. nana*
7. *R. Boyntonii*
8. *R. Kelseyi*
32. INDIGOFERA x = 8,7,(6) on 20/350 spp.
2n = unreported.
1. *I. caroliniana*
33. TEPHROSIA x = 11 on 27/250 spp.
2n = 22.
2n = 22.
2n = 22.
2n = 22.
1. *T. virginiana*
2. *T. florida*
3. *T. spicata*
4. *T. hispidula*
34. ASTRAGALUS x = 8,11,12,13 on 110/1500 spp.
2n = 16.
2n = unreported.
1. *A. canadensis*
2. *A. Michauxii*
35. VICIA x = 6,7 on 55/200 spp.
2n = 12.
2n = 14.
2n = 12,14.
2n = 12.
2n = 14.
2n = 14.
2n = unreported.
2n = (12), 14,28.
2n = 14.
2n = 14.
1. *V. lathyroides*
2. *V. grandiflora*
3. *V. sativa*
4. *V. angustifolia*
5. *V. hirsuta*
6. *V. tetrasperma*
7. *V. caroliniana*
8. *V. Cracca*
9. *V. villosa*
10. *V. dasycarpa*
36. PISUM x = 7 on 4/6 spp.
2n = 14.
1. *P. sativum*
37. LATHYRUS x = 7 on 40/160 spp.
2n = 14, (28).
2n = 14.
2n = 14.
2n = 28.
2n = 14, 42.
1. *L. hirsutus*
2. *L. pusillus*
3. *L. latifolius*
4. *L. venosus*
5. *L. palustris*
38. APIOS x = 10 on 1/8 spp.
2n = c. 40.
1. *A. americana*
39. ERYTHRINA x = 21 on 37/100 spp.
2n = 42.
1. *E. herbacea*
40. CENTROSEMA x = 10 on 1/40 spp.
2n = unreported.
1. *C. virginianum*
41. CLITORIA x = 8, 12 on 4/40 spp.
2n = unreported.
1. *C. mariana*

42. RHYNCHOSIA
1. *R. reniformis* x = 11 on 6/150 spp.
2n = unreported.
2. *R. americana* 2n = 22.
3. *R. difformis* 2n = 22.
4. *R. tomentosa* 2n = 22.
43. PHASEOLUS
1. *P. sinuatus* x = 11, (12?) on 15/200 spp.
2n = unreported.
2. *P. polystachios* 2n = 22.
44. VIGNA
1. *V. luteola* x = 10,11,12 on 8/60 spp.
2n = 22.
2. *V. unguiculata* 2n = 22, 24.
45. STROPHOSTYLES
1. *S. helvola* x = 11 on 2/4 spp.
2n = 22.
2. *S. umbellata* 2n = 22.
46. GLYCINE
1. *G. Max* x = 10 on 4/40 spp.
2n = 40.
47. PUERARIA
1. *P. lobata* x = 11, 12 on 2/12 spp.
2n = 22, 24.
48. AMPHICARPA
1. *A. bracteata* x = 10 on 2/7 spp.
2n = 20.
49. GALACTIA
1. *G. erecta* x = 10 on 4/90 spp.
2n = unreported.
2. *G. mollis* 2n = unreported.
3. *G. regularis* 2n = unreported.
4. *G. volubilis* 2n = 20.
5. *G. Macreei* 2n = unreported.

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